

APRIL 2004

Tropical Fish

THE UK'S ONLY DEDICATED TROPICAL & MARINE FISH MAGAZINE

WIN

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KEEPING
UP THE
IMMUNE
SYSTEM

PLANTS

THE START
OF AN
AQUARIUM
JOURNEY

TROPICALS IN THE WILD

OUR FRIENDS IN THE SEA

PLUS

* FRESHWATER PROFILE : STARTER FISH * BOOK REVIEWS : 'MUST HAVE'
DISCUS TITLES * MARINES : CLEANING FISH * DISCUS PROFILE : A LOOK
AT THE 'REAL' EYE * TRAVEL SPECIAL : A TRIP TO MARINELAND

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From the editor

A new start

I'd like to begin this month by introducing myself to your world of *Tropical Fish*. After two and a half years on the magazine Simon Wolstencroft has now moved on to pastures new, and myself, a keen freshwater fish keeper, has taken over to keep you up to date and bring some new and exciting articles to the magazine.

You may notice a few changes to the magazine this month with some more due in future issues. All for the good of the magazine - I hope you'll enjoy 'the new look' *Tropical Fish*.

We have taken some new writers on board this issue including Shaun and Beth Tierney, Peter Hiscock, Darren Slater, Gavin Beaumont and Nick Fletcher. Please take time to read their articles - I'm sure you'll find them as interesting as I have. And if any of you regular readers out there have any comments or any suggestions about what you would like to see in the magazine, then please don't hesitate to drop me a line at the usual address.

So with a good mixture of features old and new, I hope you enjoy this issue - just sit back, relax and soak it all up. See you next month!

Marla Hayward - Acting Editor



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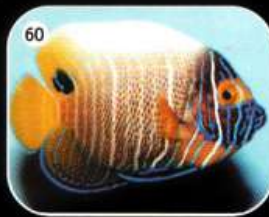
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TROPICAL FISH is published 12 times a year by Freestyle Publications Ltd. Copyright 2003 by Freestyle Publications Ltd.

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Specific Diets...



Hikari Cichlid Staple and Gold are formulated from the highest quality ingredients specifically for cichlids and other breeds of large tropical fish, backed by extensive research from the leading Japanese experts.

Both diets provide all the daily nutrition your fish need to stay healthy and make excellent growth, including high levels of stabilized vitamin C to promote resistance to stress and infectious disease.

Additionally, Hikari Cichlid Gold contains Carotene and NS Germ to aid the development of brilliant, natural colouration, and is excellent for those fish who's colouration has become washed out or who require a higher protein diet.

Both diets are available in four sizes of floating pellet that do not dissolve or cloud the water, which guarantees a perfect environment for your fish, and for you, the clearest view of their beauty at all times.



You can't feed fish better

The Filter

All the best news, reviews and information from the fish keeping world

ROWAPHOS COMPETITION WINNERS

Tropical Fish Magazine would like to say congratulations to the winners of the ROWAphos competition in our February 2004 issue. The answer to the question: 'Can ROWAphos be used in freshwater or saltwater or both?' was both.

So well done to Mr and Mrs Verrall from Wareham, Mr A J Stock from Nottingham, Miss S Dowling from West Sussex, Roy Rendell from Rhondda, Mr P Grogan from Dorset and Miss S Sheldon from Lincoln. Thank you to D & D Aquarium Solutions for donating the prizes.



A SPLENDID NEW PRODUCT

Splendid Products Ltd is launching an Algaebuster for tropical tanks with external water treatment systems. Based on the successful range of Weedbusters for outdoor ponds, the little electronic box has aerials coming from it which are looped around the re-circ pipe and controls the calcium carbonate equilibrium in the water. This results in less algae and is totally harmless too. For more details contact Splendid Products on 01235 862540

PETE THE PIRANHA

Do not fear - Pete the Piranha has not disappeared. Check out the classified pages at the back of this month's magazine to find out exactly what he's up to.

AMMONIA REMOVER



Toxic ammonia is the most lethal killer of fish in aquariums and ponds. Whilst good biological filtration will continually keep ammonia to zero, there are many instances where the ammonia level rises and this can be lethal to fish. These include when the fish system is new, damaged by medication or poorly maintained.

The Interpet Ammonia Remover is an easy to use liquid product that removes the ammonia to a non-toxic salt that can be processed by the filtration bacteria, yet leaves the water free of toxic ammonia.

The unique part of this Interpet Ammonia Remover, unlike other similar treatments, is that the ammonia removal can be monitored using a standard salicylate test kit, such as the Interpet Easy Test. This is vital if the fish keeper is to keep an accurate eye on their water conditions.

The safe ammonia remover formulation is suitable for use in all aquariums, including marine systems, and is so safe; it is used in aquaculture, where the livestock is for human consumption.

The Interpet Ammonia Remover is available in both pond and an aquarium formats.

For aquariums there is a 125ml bottle - RRP £3.99 and a 250ml bottle - RRP £5.99. The pond version is available in three sizes, 250ml - RRP £5.99, 500ml - RRP £9.69 and 1000ml - RRP £14.25.

The Interpet Ammonia Remover is available in all good aquatic outlets. For further information on this and any other Interpet products, please write to: **The Interpet Information Centre, Interpet, Vincent Lane, Dorking Surrey. RH4 3YX.**



NEW WEBSITE FOR TROPICAL FISH ENTHUSIASTS

Tropicalfishfinder.co.uk has just been launched. The aim is to provide an online resource for UK fish keepers which includes a facility for some of the best fish shops in the UK to advertise on the internet and list their current stock. Several of the main clubs in the UK have provided material for the site and there is also a TFF club which, for £6 per year, gives club card holders a discount on their fish purchases at the participating shops.

We aim to have sufficient shops on the system by the end of the year to achieve coverage across the UK. The site was launched on the 28th January and is already having a considerable degree of success with several thousand visitors each week.

Andrew Collins
www.tropicalfishfinder.co.uk
Tel: 02082974199.

EAST MIDLANDS AQUATICS

East Midlands Aquatics (Trowell, Nottingham) have just launched the new online shop. Now you can look at an online catalogue and order over the phone. This gives you the opportunity to receive the same high standard advice and service as you get in the shop, but the best thing is you can get the service without leaving your house. The online shop also incorporates an online chat room and bulletin board giving you the chance to ask questions and air your opinions. Visit them at www.eastmidlandsaquatics.co.uk

Due to the time it takes the staff at East Midlands Aquatics to restock with livestock, they now have new opening times. Monday, Friday and Saturday 9am until 6pm, Tuesday and Wednesday closed, Sunday 10am until 4pm and Thursday late nights 9am until 8pm.

They are also offering a 40-gallon reef set-up for well under £600 including system, lights, skimmer power heads and even the live rock! For more information call 01159 300921

OUR CONDOLENCES

Many of you may have already heard about the tragic death of Derek Lambert, Editor of Today's Fishkeeper magazine. Dick Mills has allowed us to publish a memoir written for Derek, so on behalf of everybody here at Tropical Fish magazine, we would like to wish Derek's family our sincerest condolences.

Derek Lambert

Although taken from us so suddenly and at such a young age, nevertheless he managed to pack an awful lot of fish keeping into his life.

He began around the age of 11, as a junior member of the Kingston Aquarist Society based in south-west London. After a few years on the competitive scene, he turned his interest to livebearers? An aspect of fish keeping that he was to make his own speciality.

He authored several books, but his real forte was getting his hands wet, delving into the natural

waters of his beloved fishes mainly in Mexico and just recently Cuba.

When 'The Aquarist & Pondkeeper' magazine was seeking a new Editor in 1999, Derek fitted the bill perfectly. He brought the same zeal and organisational abilities that he had refined whilst heading up the 'Viviparous' specialist livebearer Society to this 'office job' and quickly produced a magazine which was both authoritative and entertaining.

For such an eminent aquarist he was in great demand as a lecturer, visiting many countries and meeting hundreds of aquarists in the process. Derek was still able to converse with every level of fish keeper, from novice to expert, yet was always ready to admit he was still learning.

We feel especially sad for his mother, Pat, his companion on many a field trip and constant support through the years. Can there be anything more



distressing than for a mother to lose a child?

In today's 'instant' society where it seems that the younger person is not willing to get

involved, Derek could be seen as an exception; his departure will leave a void that will take some filling.

Dick Mills

STAINLESS REEF



Lodge Solutions have just released a smart new range of stainless steel aquarium cabinets. Cabinets from this new range are modern looking, sleek, and fit in with most room designs. Only 316 grade stainless steel is used in the construction of the cabinets, so they will easily withstand saltwater. The finish is available in different grain polishes. Coming out soon, metal halides in stainless canopies.

For more information call East Midlands Aquatics on 0115 9300 921

PLYMOUTH DISCUS

Plymouth Discus is launching a new product known as the 'Gourmet discus diet hamper pack discus delights'. Until now the discus keeper has only had a very limited choice for safe dried foods (diskusin etc), but now with the release of this new product, our king of the aquarium will have a different safe dried food for every day of the week.

For more details contact Chris Ingham on 01752 784671

SEND US YOUR NEWS!

The Filter will have all the best news, reviews and information from the tropical fish world. If you have something you want to share with our readers, then don't hesitate to get in touch. Whether it's news on a product from your company or an event happening in your area, we

want to hear from you. Send in the details to The Filter, Tropical Fish, Freestyle Publications, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ, e-mail reception@freepubs.co.uk or fax: 01202 733969.

NEW - INTERPET FISH FOODS

Following the highly successful launch last year of their aquarium food range, Interpet has added two new items to meet customer demands.

Tropical flake and Goldfish flake are now available in a new one litre (200gram) size. These larger sizes feature the same distinctive Interpet packaging and product quality that has helped give the UK's leading aquatic manufacturer its enviable reputation in the market place.

As with the smaller sizes of flake, both the new foods contain the immuno-stimulant Beta-glucan that aids fishes' immune systems and helps combat disease. Other

key ingredients in this premium quality range include the highly effective, natural colour-enhancer Spirulina, a type of algae that has long been recognised as one of the most efficient natural colour enhancers available. Reds, blues and yellows are all enhanced and your fish will appear vibrant in the aquarium.

All the essential vitamins required in order to provide aquarium fishes with a nutritious varied diet, including vitamin C, are included.

In addition to flake foods, the Interpet aquarium food range includes granular foods for both

tropical and coldwater fish, and an adhesive tablet that can be stuck to the inside of the aquarium, allowing fish keepers to watch their fish feeding at the front of the aquarium.

The tablets are also ideal for catfishes such as plecostomus, when allowed to sink to the bottom of the aquarium.

Mrrp £13.99 (tropical) and £8.49 (goldfish)

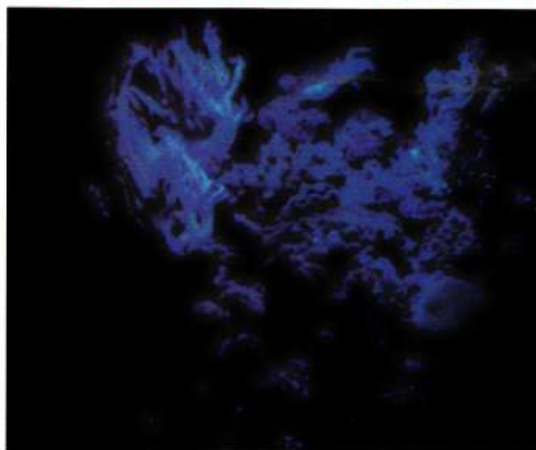
For further information on this and any other Interpet products please write to **The Interpet Information Centre Interpet, Vincent Lane, Dorking, Surrey, RH4 3YX.**



ONCE IN A BLUE MOON

A new blue reef light has just been launched by FISH SCIENTIFIC. These lights emit a convincing moon light effect, ideal for use by anyone wishing to replicate the natural moon cycle to encourage spawning. One of the most impressive things about these lights is the compact size at just 4x4x2cm, making it easy to install in the tightest space - in the hood. Two light units are currently available, one high output ideal for use as a night viewing light and the other unit is a dimmed unit, ideal for moon simulation.

For more information contact Jan on 07782 169632



THE BRITISH CICHLID ASSOCIATION

BRITISH CICHLID ASSOCIATION

The British Cichlid Association was formed some 30 years ago by a group of cichlid enthusiasts to encourage the keeping and breeding of these interesting fish and the dissemination of information on them. Over the years it has grown to be recognised both in the UK and overseas as a valuable source of support and information, and as a means for cichlid fans to contact and befriend others with this shared interest.

The BCA publishes a bimonthly newsletter and a colour magazine - Cichlidae. Sample publications can be obtained by sending a cheque/PO for £3 to the address below. The BCA also has a website, open to anyone, at www.britishcichlid.com, and now featuring a discussion forum.

BCA sales stocks a range of quality cichlid books, many otherwise difficult to obtain in the UK, including Cichlid Press and Aqualog books. A small selection of catfish titles has recently been added. Also available are cichlid posters, videos, CDs, and other items. Again, this service is available to the public. For further details please visit the website sales area or request a printed list from the address below.

The BCA holds two meetings each year: the Spring Convention and the October AGM/Convention. Each meeting features at least one noted guest speaker, an auction, the sales stall where books can be browsed before buying, and other attractions. The next meeting will be at Hull University on April 4th, featuring lectures on malawi cichlids by Professor George Turner and on Central American cichlids by Dutch expert Willem Heijns, plus a tour of Professor Turner's aquarium facility at the University.

Membership costs just £15 single (£15.50 joint) per year.

Further details of the BCA and the forthcoming meeting can be obtained from the website or by writing (SAE please) to BCA Publicity (Dept TFX) 70 Morton St, Middleton, Manchester, M24 6AY.

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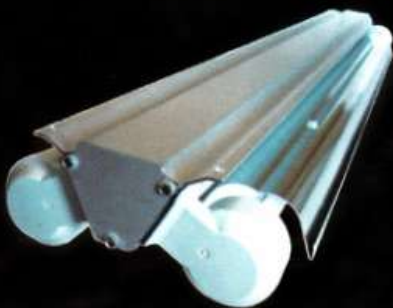
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Of paramount importance are our special 'gull wing' shaped reflectors, which are included with the light. They catch the light from the back of the T5 and reflect it around the tube NOT through it. This maximises the available 'Light per Watt' providing up to 10% more than from an equivalent HQI without the radiant heat gain.

Some companies offer a white tube and a blue tube to provide the correct colour for a marine environment, the white tube gives off intense light however the blue provides little in visible intensity.

In contrast the standard D-Deltec® unit comes complete with two blended 60/40 tubes, which were developed specifically for hard coral growth down to 800mm water depth. As both tubes are fundamentally white, but with the correct blue parts of the spectrum added, they both give off an intense visible light.

The result, a visibly brighter tank with wavelengths that the corals can utilise producing a huge improvement in colour and growth but without the shading caused by point source lighting.

Aquablue Plus – now brighter for longer!

The standard Aquablue tube has been improved and is now brighter and for longer.

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Complete range of tubes.

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- **Pure Actinic** – The name speaks for itself.
- **Aquablora** – Enhances plant growth and fish colours in freshwater aquariums.
- **Middy 6000** – is rated at 6,000 Kelvin with a spectrum designed to recreate sunlight. For both Saltwater and Freshwater Aquariums.





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The number of guppy colour types now available is staggering, but the price we pay for this choice is a weaker fish prone to disease and a shorter life-span.

First fish

When your new tank is finally ready for livestock which ones will you choose? Peter Hiscock gives some tips on suitable 'starter fish'

Providing correct advice to new fish keepers is a tricky business and more often than not conflicts of opinion occur between myself and information already attained by the fish keeper. Through years of practice I have developed the skills to explain my reasons and quickly gain a customer's trust. When the new fish keeper achieves success, I am rewarded with an increased conviction and am able to share the future highs and lows of their new interest. ►

Algae eaters like this *Ancistrus* sp. need constant feeding as well as a good source of naturally occurring algae, which may take a few weeks to grow



Learning to be right

The repeating 'status quo' of bad advice on specific subjects would continually amaze me if I had not been a party to providing the same bad advice many years ago. Between my earlier years of working in retail aquatics and the not so distant past, I spent a long time learning to undo the knowledge I thought I had.

THE 'RED' LIST

These fish are some of the most popular fish in the hobby but as first fish they are highly unsuitable. Neon tetra's (six to eight weeks), guppies (two months), dwarf and honey gouramies (when the tank is two-thirds stocked), scavenging fish (two months), algae eaters (six to eight weeks or when plenty of algal growth).

The reason I am telling you all this is that I am about to provide some suggestions for good and bad 'first fish' for the aquarium. Based on the information most new fish keepers have, you may think I have got the lists the wrong way round.

So what makes a good first fish?

The obvious qualification must be to withstand the water quality fluctuations common in new aquaria and to resist diseases caused by stress. Equally important are the behavioural attributes: peaceful, social fish are often best although this does depend on the overall community. A factor often overlooked is the fish's ability to adapt to new surroundings, not in terms of water conditions but simply the type of décor and the present fish population.

Some fish, particularly large or active fish will quite happily settle

SOME FISH, PARTICULARLY LARGE OR ACTIVE FISH WILL QUITE HAPPILY SETTLE INTO A TANK WITH LITTLE DÉCOR AND NO TANK MATES

into a tank with little décor and no tank mates. Other fish will find this distressing and despite perfect water quality will soon try to hide, stop feeding, and succumb to illness. Many fish use the fact that there are other fish in an aquarium as a sign that the environment is safe. So a good first fish species would be one that is hardy, disease resistant, sociable, adaptable, active and confident.

Starting with guppies

Now we can look at getting rid of some old habits and where better to start than with the infamous guppy. Guppies are like a magnet for new fish keepers being confident, active, small, very

brightly coloured and of course everyone knows that guppies are hardy and easy to keep, well they used to be anyway. Today's guppies are somewhat different from the guppies of yesterday and in many ways are a victim of their own success.

The guppies of old were tough as old boots and would survive almost anything. However, intensive breeding and a quick succession of generations have led to the vast majority of guppies available nowadays having the ability to die at the drop of a hat. Inbreeding, a lack of natural selection and the comparatively sterile aquarium environment have all taken their toll on the guppy's natural immune

The corydoras group of catfish have a great character and deserve to be kept properly in groups with a weed bed, which can only be given in a well-established tank



Whilst in the shop, rainbowfish may look a little drab, but given a few months they will soon develop intense colouration like this boesemani rainbowfish



Bright colour forms of the dwarf gourami are an instant attraction but these fish are timid and prone to infection in an un-matured environment



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system; the slightest hint of bacterial infection can now wipe out an entire tank.

Too many triggers

All is not lost however, in a well matured and stable tank, a good

THE 'ORANGE' LIST

These fishes are always popular but must be chosen with care if they are to be a first introduction. Pick healthy specimens, pay attention to purchasing the correct quantity, and make sure that water conditions are tailored for good health (adding salt for livebearers). Most tetras (keep in groups of six or more per species or 10 or more if first fish), livebearers (mollies, platies, swordtails - pick healthy fish and add aquarium salt), dwarf cichlids (Kribbs, apistogrammas, rams - use correct water hardness).

bunch of guppies should do fine for their usual lifespan of around 18-24 months. In a new aquarium however, there are simply too many 'triggers' for disease to consider the guppy as a good first fish. Other popular livebearers including swordtails, mollies, and platies also suffer similar problems and are particularly prone to skin-related diseases. Specimens in full health however, are normally fine as a first fish and the occurrence of disease can be partially prevented by the correct use of aquarium salt.

Tetras

A close second for popularity verses unsuitability is the humble neon tetra, again a popular fish for new aquariums. Neons are lovely little fish and I'll hear nothing bad about them, but they do tend to be a little timid, are sensitive to fluctuating conditions and are

THE SLIGHTEST HINT OF BACTERIAL INFECTION CAN NOW WIPE OUT AN ENTIRE TANK OF GUPIES

prone to disease problems in new aquaria. A well-established shoal of neons can live for many years, but if introduced too early you will be lucky to get a few months.

Many other small tetras are also a little timid as first fish in new aquaria, unless they are

introduced in large shoals of ten or more, but are ideal as a second or third introduction.

Catfish

Catfish are next in line. I say 'catfish', but what I really mean of course is the popular *Corydoras sp.*

Guppies have always been at the top of the list for new fish keepers and whilst they may look better than ever they have lost the hardy nature which first made them popular



Freshwater profile

Male guppy



Whilst not as weak as many guppy strains, mollies can still easily succumb to disease. The addition of aquarium salt can help to prevent most problems

EXCLUDING THE LARGER BARB SPECIES, BARBS IN GENERAL ARE VERY GOOD FIRST FISH

group of catfish. The reason why these are not suitable as first fish is a little complicated as the fish themselves will settle into a new tank with no social, disease or confidence problems. The problem is that to keep these fish properly they need to be kept in groups and given a varied diet of sinking foods and frozen or live foods such as bloodworm. In a new tank, feeding a whole group on these high protein foods creates the ideal conditions for an overdosing of waste product and a 'system crash' resulting in high ammonia/nitrites and untold tragedy and turmoil.

What about gouramis?

It is worth mentioning that in recent years the dwarf gourami (*Colisa lalia*) and honey gourami (*Colisa sota*) have undergone a change similar to that of the guppy with new striking colour forms emerging along with all the associated problems of intensive breeding. These small gouramies also suffer from a nervous

disposition making them unsuitable for new aquaria and best left for a month or two before being introduced.

So what are the alternatives?

I've now removed some of the most popular groups of fish as suitable for a first introduction, so I'd better give some good alternatives. To start with I'm going to fight the case for barbs, which always seem to be continually tarred with the undeserved 'nippy and aggressive' brush. Without doubt this is largely due to the tiger barb (*Barbus tetrazona*), which can be very nippy and troublesome, but in my experience this only occurs when too few are kept together and they are mixed with the wrong fish, for instance if a small group of tiger barbs are kept with colourful long finned fish and they get nipped beyond recovery. So, the question has to be, was it the barbs or the long-finned fish which should not have been introduced?



The pentazona barb has all the attributes of a great community fish, but is often overlooked simply because it's a barb

Excluding the larger barb species, barbs in general are very good first fish having all the attributes mentioned earlier. Whilst not as colourful as some fish, they certainly do have personality and style.

Somewhere over the rainbow

If you do want something with a little more flair then the rainbowfish family are well worth a look. These peaceful fish have hardly any demands, although they often prefer harder water, and will mix well with other active fish. Most rainbowfish only develop their full colour once they have been settled in an aquarium for a few months, so it's important to see their potential when they may look a little drab at the point of purchase.

The bigger the better

The larger gourami species are good first fish for aquaria with plenty of plants and hiding spots. Pearl and moonlight gouramies are ideal for most aquaria whilst the opaline, gold and three-spots are suitable providing they are kept in a minimum group of five. Because opaline, gold and three-spots are all the same species the group can be a mixture, but if kept in small numbers one will become dominant and bully either all the others or pick on the weakest of the group.

Conclusion

During the first few months of an aquarium's life there are many more complex processes going on that can be easily explained in a few sentences. Most aquarists are aware of 'new tank syndrome', which occurs when the waste production of fish (ultimately dependant on feeding levels), exceeds the waste processing capabilities of a filter's bacterial population. There are also rises and declines of other useful and harmful bacteria, changes in water conditions and an overall settling down of the environment.

During this period the fish are under a constant low level of stress and it is only certain fish that can live through this time without harm, making the environment ready for the introduction of the fish you really want to keep. **FIL**

THE LARGER GOURAMI SPECIES ARE GOOD FIRST FISH FOR AQUARIA WITH PLENTY OF PLANTS AND HIDING SPOTS



Equally important to providing the right care is providing an environment which makes the fish feel safe. This anabantid gourami has plenty of hiding spots amongst bamboo and plants

THE 'GREEN' LIST

These fish are hardy, adaptable and ideal first fish. Remember to check sizes and temperaments of species as not all fit into the 'norm' for their group. Rainbowfish, larger tetras, small barbs (cherry, golden, pentazonas, ruby, rosy, tiger), some gouramies (pearl, moonlight, gold, opaline, three-spot - keep in groups of five or more), danios.

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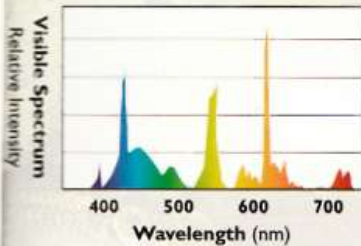
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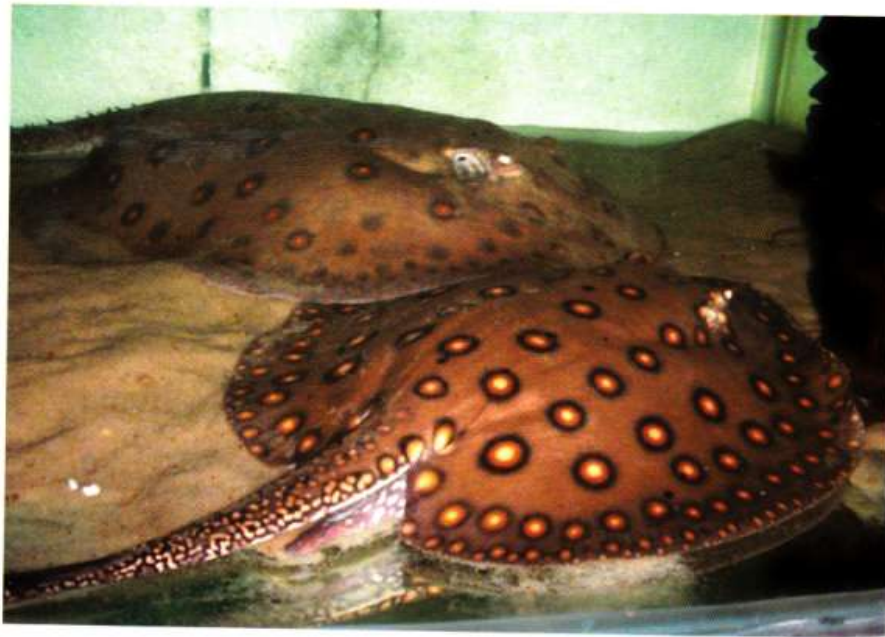
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THE STING OF THE DISCUS

When you're not sure which species mix, don't go ahead and risk fatalities - take some advice from the experts and get it right first time around



The motoro stingray. NOT to be kept with discus

All photos courtesy of the author

DID YOU KNOW?

The male laticeps will not grow as large as the female

In the wild discus and stingrays often cross paths and have to live together. Both are native to South America and live in the freshwater rivers connected to the Amazon.

Many discus keepers do not know that you can keep the two species together in a home aquarium, but with the right

WHEN HOUSED CORRECTLY IN CAPTIVITY THE TWO MAKE FASCINATING SUBJECTS

accommodation, equipment and knowledge it is possible. When housed correctly in captivity the two make fascinating subjects. The rays with their stealth tactics can disappear under the sand like deadly ninjas ready to attack. But they are not aggressive fish and

will usually only use their famous 'sting in the tail' if harmed or they feel threatened.

Size matters

First of all, before embarking on this mix, a suitable environment is a must, as is the type of stingray



River sand is best for a ray/discus set up, but rounded gravel is a second best



This baby motoro would only be suitable for a short time with discus



Laticeps make the best tank mates for discus

JS
some



Ample floor space is essential for rays.

to wish to keep with your discus. Firstly, not all stingrays can be kept with discus and secondly, the size of the living quarters must be ample for the two species to live in harmony. The minimum size is at least four foot long by two foot wide by 18 inches deep. Clear floor space is the main consideration here. This size tank would house one stingray and four to six discus comfortably at adult size. If a larger collection is desired, two stingrays with six discus would be comfortable in a six foot by two foot by two foot tank.

TWO

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Choosing it the right ray!

The next thing to think about is the right ray to keep. *Potamotrygon leopoldi* is a beautiful ray, but when fully grown is totally unsuitable with discus. Only this week I was told yet another horror story about an experienced discus keeper. He had purchased a 12-inch leopoldi to mix with his beloved discus, which

was fine for two days, but on the third day he came down to feed his admired collection and found his new arrival feasting on a sun set

THE TANK NEEDS TO BE FREE OF CLUTTER, LIKE MASSES OF BOG WOOD, ROCKS AND PLANTS



Living on a knife edge. Notice another Amazon species at feeding time?

DID YOU KNOW?
The best way to catch a ray is to sink a large plastic bag in the tank and guide the ray into it with a net.

Discus Profile



Discus like this wild Tefe are used to living with small rays

tiger. Well it was certainly the sun well set for that discus!

And the wrong ray...

Another stingray to steer clear of with this set-up is the motoro. Again, a beautiful ray but not a good idea to mix with discus. In fact the only type best kept with our king of the aquarium is the laticeps, or as it is commonly known, the common tea cup. These rays only grow up to 14 inches and are the smallest of the freshwater rays, which makes them a good choice to mix in with discus. The best size I have found to start with is young four-inch rays with three to four-inch discus. It is also cheaper on the pocket.

WHERE TO GET HELP OR ADVICE DISCUS AND STINGRAY SPECIALISTS:

Plymouth Discus - 01752
784671
The Fifth Day - 01752 268000
Aquatour - 01803 323253

STINGRAYS SEEM TO BE ADAPTABLE TO MOST KINDS OF WATER IF SLOWLY ACCLIMATISED

The right environment

As briefly mentioned earlier, the most important factor to begin with is the correct environment. We know the correct sizes of the tank and the stock, but now we

have to look at the 'furnishings' of the aquarium. It needs to be stingray friendly. If possible it is best to settle in the stingrays first, but not essential.

Substrate needs to be river sand



Rounded stones make ideal aquascaping

DID YOU KNOW?

Keep a spare hospital tank handy for treating discus, as only a few treatments can be used with stingrays. Treatments safe for rays are formalin, Interpet no. 9, anti ulcer, melafix and aquatic tonic salt.

(not coral sand) as this is inherited and will not raise your pH or hardness like coral sand. A bare bottomed tank is also suitable as better for newly arrived specimens as they can see the food easier. Rounded gravel can be used, but this makes it harder for them to hide as they sometimes do. Also, some gravel is too sharp for rays and they can easily rip their delicate outer disc.

The tank needs to be free of clutter, like masses of bog wood, rocks and plants.

I go for a happy medium, nice clear floor space with some large plastic plants weighted to the base of the tank, with rounded stones small bits of good, quality hard wood holding them back. This seems to work well and looks pleasing to the eye, also giving the discus somewhere to hide at night.

Water

Stingrays seem to be adaptable to most kinds of water if slowly acclimatised. But seeing we are keeping them with discus the water parameters must be suited for the discus. I keep mine in a pH of 6.3 to 6.5 with a temperature of 82 to 84°F. Ammonia and nitrite must be zero.



THE RAYS NORMALLY BECOME TAME AND WILL READILY TAKE FOOD FROM YOUR FINGERS OR AS SOON AS IT HITS THE WATER

hardness of three and GH and nitrate as low as possible, but under 40ppm.

Diet

Now this is the big one, as I have a special feeding regime for discus and rays. As discussed in past issues, I only feed my discus on safe freeze dried foods and flakes. Apart from once a week when I treat them with the beef heart mix.

Firstly, at the right hand side of the tank I feed the discus with these flake foods. While they are in a frenzy feeding like they will never be fed again, I feed the rays six feet away at the left hand side of the tank. The rays normally become tame and will readily take food from your fingers or as soon as it hits the water, before the discus have a chance to get to it.

I feed the rays on a mix of chopped prawns, shrimps, white bait (if you can get it), cockles and mussels and they get this twice a day.

Filtration

Obviously with all the chopped shrimps and fishy morsels in the water, filtration is a serious part of the set-up. The way to do this

is to have two large canister filters, and service them every two months - but only one at a time, every other month. This keeps the biological filtration system unharmed and keeps the flow rate good through the canisters. Sump filters are another good choice and can even be made by the DIY expert. Pond filters have also been used with great success.

Abide by these guidelines and you should have a recipe for a healthy, happy tank where all your fish get along swimmingly. 🐟



The man himself - Chris Ingham

DID YOU KNOW?
If something goes wrong and you get stung, put the area in as hot a water as you can stand and seek medical help as soon as possible.

ABOUT THE AUTHOR

I have been keeping tropical fish since I was nine years old and without giving my age away too much, have kept tropical fish for over 30 years. In that time I have kept pretty much everything, from guppies to marine fish. When caught with my arm in the tank instead of doing my homework, my mother used to tell me: "Chris! Messing around with your fish will not earn you money." I still remind her of that moment from time to time. But it is in the last decade I have been famously known for breeding and now retailing discus.

It all started off with a small two-foot tank in the cellar of our house and my very first fish was a cory cat. I saved up all my pocket money and paid 37 pence for it. Run of the mill tropicals followed and this took me into piranhas, African cichlids and South American cichlids. Marine fish and inverts then took over, but a big fire in a local department store cut the electricity off for over 18 hours and I lost all my marines.

I then bred angels and then finally, the king of the aquarium, discus. With everybody breeding angels, the market flooded and with nowhere to sell them on I started to breed discus. Since then it has taken over my life and is now my job.

With the help of Enterprise Plymouth, who taught me how to run my own business, and a government grant to expand my fish house and make into a shop - Plymouth Discus was born.

Hopefully the business will continue until I pass it on to one of my children. They sometimes help out with water changes and seem to like the time they spend in the shop. I now have a new hobby, playing the drums. Knowing I do nothing on a small scale my wife has started packing a large suitcase already!

Drooling over discus

Iggy Tavares looks at some 'must have' books for the discus enthusiast



WAYNE DISCUS GUIDEBOOK

'Wayne Discus Guidebook', edited by Wayne Ng and Liang Chi with contributions from several authors, might look like just a discus photo book, but there is more to it. Cleverly hidden among the photographs there are one or two interesting topics. Told with mainly photographs and some words is 'the origin of the wattle discus', 'its continual improvement' and 'the development of the blue diamond discus'.

'Important techniques for breeding discus' is dealt with in a very cursory way with just one page of text that contains no important information at all! 'Sexing discus' offers a few pointers but it is hard to believe that male discus have visibly thicker lips and wider and larger mouths compared to females.

The best chapter in the book is probably 'disease recognition, prevention and treatment' by Mairivi Laurel, which is all of seven sides and covers 'the discus hobbyists medicine chest' listing 11 drugs and their uses in treatment of disease and parasites, as well as common discus ailments with some detail of each ailment.

Other topics touched upon are discus physiology, water condition, central filtration and beef heart preparation. The saving grace of this book are the 58 full page discus photographs artistically laid out on the page with the strain name and sometimes with added description. Also included are some 40 plus smaller photographs used to illustrate the text. This is not a must have book, but then some discus hobbyist might find the photos irresistible.

Wayne Discus Guidebook: ISBN none, hard cover, 104 pages, 58 full page photos, £25 including postage.

MALAYSIA DISCUS

'Malaysia Discus' produced by the Discus Society of Malaysia as a dual language book in Malay and English, opens with some limited information on discus development history in Malaysia. It goes on to give a brief history on development in Malaysia of golden discus, ghost discus, blue diamond, snake skin, rose red, leopard snakeskin and white discus, all beautifully illustrated with various forms of the discus strain.

The rest of the book features some 38 breeders who are allocated one, two or more pages in the book to show off their best discus which are printed four to a page. Sometimes a photograph of the breeder is also included. At the bottom of each page there is some information on the strains of discus in stock, any prizes won and the size of their breeding facility which appears in Malay and English. Unfortunately no contact details are provided for these breeders. However, at the front and back of the book there are 20 full page advertisements of discus exporters with full contact details that include addresses, telephone and fax numbers and web information. Judging by the colour photos of their discus shown, they should be able to fulfill every discus hobbyists' fantasy.

Many might class this book as a discus picture book, but it can be very useful in putting a name to the new strains of fantastic discus coming out of Malaysia when you get round to putting your order in.

Malaysia Discus: ISBN none, hard cover, 144 pages, 500 plus photographs, dual language, £33 including postage.



EXOTIC DISCUS OF THE WORLD

Asia has been the centre for the development of beautiful new discus since Kitti Phanaithi first gave the world pigeon blood discus. Hence, it is only natural that many of the most colourful discus books are being published by various Asian experts.

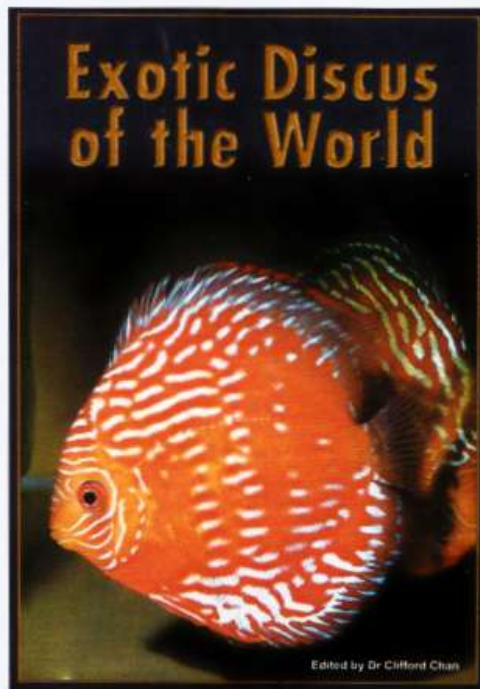
The newest offering, launched at Aquarama 2003, is 'Exotic Discus of the World' edited by Dr Clifford Chan of Singapore, who has managed to induce many of the 'leading lights' from the discus world to write a chapter for the book. Jack Watley in 'The Discus Hobby - Past, Present, and Future' reminisces on his discus experiences and his aspirations for the discus strains to come. 'Breeding Discus' by Jack Watley and 'Breeding Healthy Natural Discus' by Manfred Gobel and Friedhelm Steter gives the reader two differing ways of achieving breeding success.

'Wild Discus in Nature' and 'Collecting Wild Discus' by Oliver Lucanus and by Masahiro Uemura gives the reader a good insight of the natural Amazonian habitat which is inhabited by various species and strains of beautiful wild discus. Novel topics include 'Enhancing the Colour of Discus' by Andrzej Ogronnik and 'A Detox Liver Herbal Tonic' by Frederic Chua.

A superb chapter on 'Discus Health' by Dieter Untergasser gives a lot of information with photographs of various diseases and parasites, while 'Water for Discus' is covered by Guido Rothe. All these chapters cover their subject in-depth, with just a few photographs as necessary. 'Exotic Discus of the World' is however rich in beautiful discus photographs. The superbreeders' section covering Kitti Phanaithi, Wayne Ng, Mark Tan Chee Lok, Lee Tong Juan, Chan Ming and Chai Koon Seng, tell us some of their secrets to success.

More beautiful photos are to be found in 'Asian Discus - Developments and Future Trends' and in 'Gallery of Discus', 'Exotic Discus of the World' featuring the knowledge and experience of world experts is a must have book for the discus hobbyist in spite of its price tag of £40.

Exotic Discus of the World: ISBN 981-04-9876-4, hard cover, 124 pages, 230 photographs, £40 including postage.



SINGAPORE DISCUS IN THE NEW MILLENNIUM

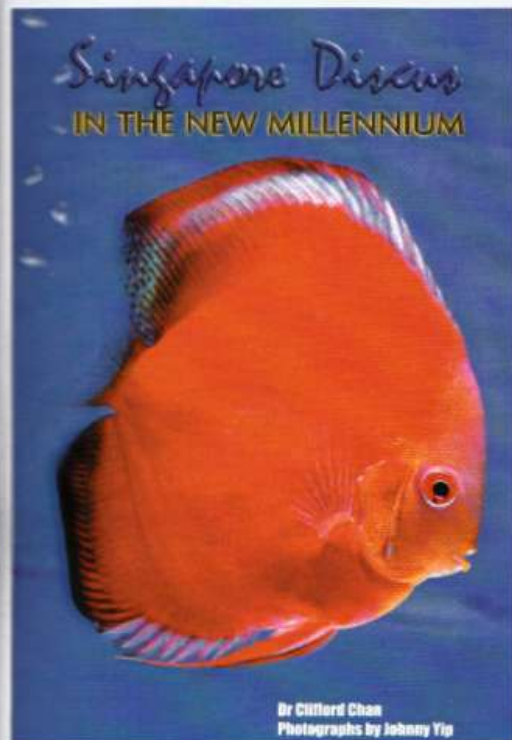
'Singapore Discus in the New Millennium' is another book by Dr Clifford Chan with photographs taken by Johnny Yip. This book features seven of the top breeders in Singapore, devoting eight pages to each, some six pages of which are filled with photographs. It describes how they started with discus, developed some strains and more.

The Gan Family - the pioneers attributes development of the discus hobby in Singapore. They started with discus and angels in the 1960s. Their winning discus at Aquarama in 1989 and 1991 coupled with photographs of Gan discus in TFH publications made them famous. Interestingly, the Gans maintain breeding groups of one male and two or three female discus per tank, removing eggs from parents a day after they have been deposited and raising their discus fry artificially.

Other breeders featured are See Chew San - creator of the san merah discus; Lee Tong Juan - Mr Grand champion; Chai Koon Seng - king of commonwealth; Simon Pak - the new generation; Ivan Seah - the passionate hobbyist and Chan Kok Eng - the quiet genius. They all offer something novel in their methods with photographs of some of their best creations.

The book has separate chapters on water, nutrition, breeding, preparing brine shrimp, disease, acclimatising wild discus and discus in competitions. Each subject covered in four to six pages is laid out in an easy to follow format making it suitable for both the beginner and the more experienced hobbyist. 'Singapore Discus in the New Millennium' offers some of the secrets of the Singapore discus masters and topics essential for discus husbandry, making it an attractive book.

Singapore Discus in the New Millennium: ISBN 981-04-4253-X, hard cover, 102 pages, 108 discus photos, £33 including postage.



I purchased all these books from Paul Lucas of Discus South who advertises in Tropical Fish magazine and has a web page at www.discus-south.com. Paul can be contacted by e-mail at paul@discus-south.com. 

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THE SALT CELLAR

Your monthly guide to marine fishkeeping

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Dr Stewart Owen looks at the blue striped cleaning wrasse

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David Garratt looks at the 'real' eye

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A trip with Iggy Tavares

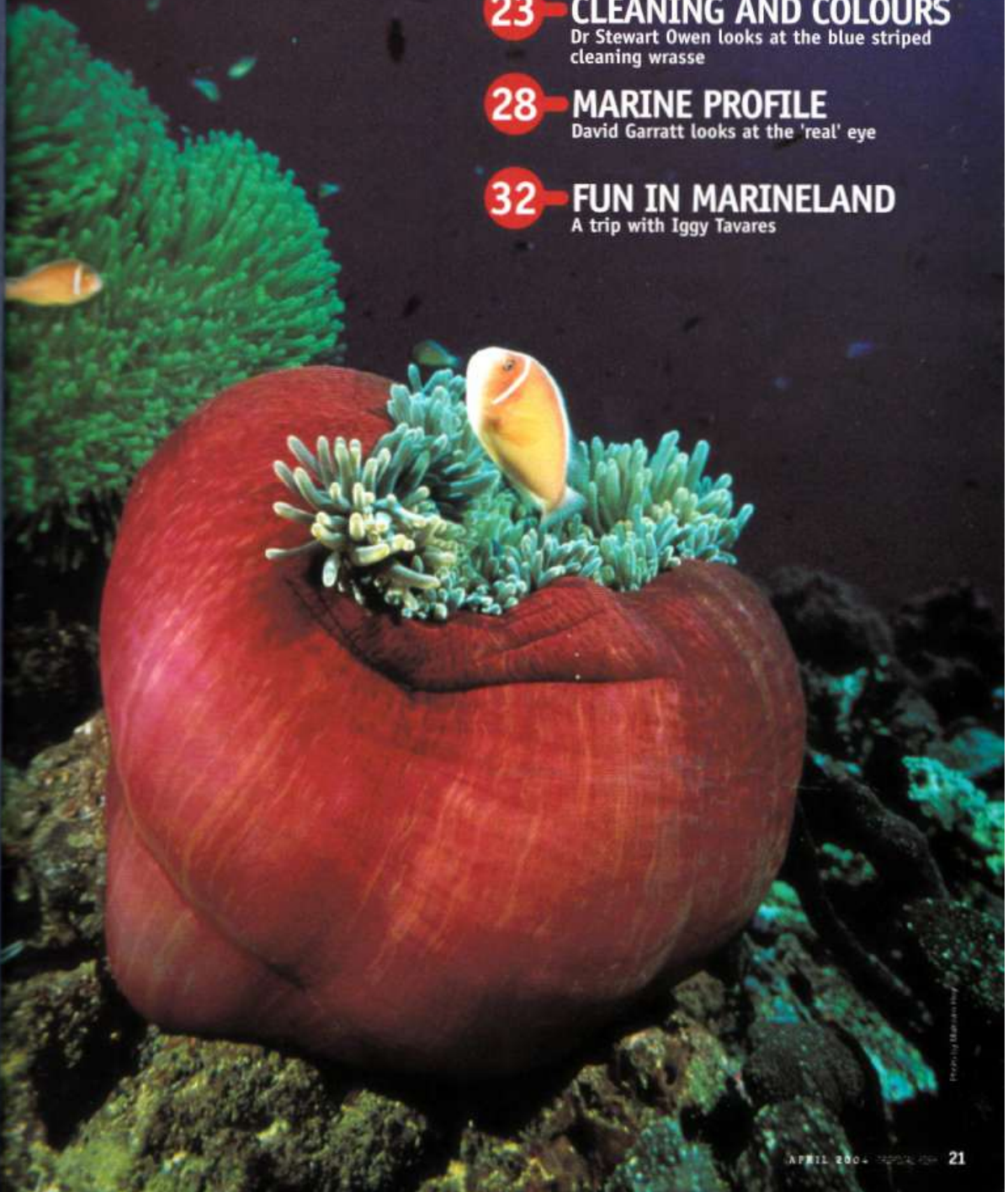


Photo: Marianne

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A colourful shade of clean

'Keep clean and safe'. This is the moto for the cleaner wrasse. Dr Stewart Owen explains how this little fish survives amongst predators while still getting the job done



The blue striped cleaner wrasse gets its name from its unusual behaviour of consuming ectoparasites from other species of fish. This behaviour is normal for wrasse and not by any means exclusive to this species. In fact there are 15 different families that have species observed to 'clean', but the best-known cleaners are found in the wrasse and gobies. These cleaners do not limit their diet to the parasites of other reef fish. In fact parasites probably make a small but variable part of their diet.

Those reef keepers who have actually kept these fish will have found that although they do in

fact continue to offer a cleaning service, they much prefer a rich food. Frozen shrimp, fish or crab, take preference over the tiny pickings from inhabitants of a modern reef tank.

A little personal grooming?

The cleaner wrasse are famous for setting up a cleaning station on the reef. Something about their appearance, their colours, pattern or posture, communicates their intention to clean away parasites and damaged tissue. Whatever the signal to other fish, this seems to be a universal language as most species will switch from a desire to eat these bite sized fish, to a demeanour where they offer themselves to the wrasses' service.





A well camouflaged goby

It is a mutual trust as the cleaner is at risk when entering a predatory specie's mouth to pick

COLOUR CONTRASTING

Humans find blue and yellow colours contrast strongly, detected by different cells in our eyes, so maybe this is one reason why we find reef fish so attractive.

Humans have difficulty separating different shades of blue, but fish may not. While a blue fish may be camouflaged against the background sea to us, it may contrast strongly to other fish.

Cleaner wrasse supplement their diet by eating ecto-parasites from other reef fish that queue up at specific 'cleaner stations' on specific parts of the reef.

out uneaten and trapped food and could be easily eaten - but the cleaner is also in a position of some power. Dashing in and out of the gill cavity and picking amongst the delicate gill filaments, the host fish puts itself at some risk from the wrasse. A careless bite from the wrasse could inflict great damage on the predator, possibly even resulting in the fish bleeding to death. So what tells the fish to trust the cleaner?

Attraction and protection

The cleaner wrasse needs to attract client fish but protect themselves from predators. Being a blue and black striped fish you may assume wrasse can camouflage themselves well in a dark blue ocean, but in fact this is not the case. The colour vision in fish works in a

FISH DO NOT APPEAR TO BE ABLE TO SEPARATE GREENS AND YELLOWS AS EASILY AS US

completely different way than you might expect and this means that fish don't always see what you and I see.

A predator's eye

The fish's eye can be thought of as similar to the power of a scanner on a computer. Just as different scanners can resolve pictures to a different clarity (for example 600, 1,200, 2,400 dots per inch), the number of light detecting cells, or more accurately the number of nerve endings, in the retina of a fish eye determines the clarity (resolution) of the picture a fish is able to see.

Different species can resolve

patterns at different distances, depending upon factors such as the size of the eye and the size of the pattern, as well as the number of nerves in the eye. In principle, larger fish have larger eyes and so better resolution; they see things in greater detail further away.

DID YOU KNOW?
Blue light penetrates water to a greater depth than other colours



Cryptocentrus cinctus goby



Cleaner wrasse



Bancos brown goby

ocean or green of the reef. This means that the wrasse can display itself to obtain client fish close by and not attract unwanted attention from potential predators further away.

Nature is fabulous

There are such complicated developments and delicate balances that never fail to amaze. Not only have these species evolved to fit such a specialised niche where they advertise their cleaning service to other unrelated species, but also another species has evolved to take advantage of this special relationship.

The 'false' blue striped wrasse looks at first glance just like any other cleaner wrasse. It mimics the cleaner in size, colour and behaviour, it even works from the same cleaning stations as the real cleaners. But as fish submit for cleaning, the 'false' cleaner dashes in and bites away a piece of healthy tissue. An incredibly complex balance must therefore exist in the number of these 'false' cleaners in any particular area, compared to the number of

GENERALLY REEF FISH THAT ARE 10-30CM LONG RESOLVE PATTERNS IN THE RANGE OF ONE TO FIVE METRES AWAY

Generally reef fish that are 10-30cm long resolve patterns in the range of one to five metres away. At greater distances the contrasting patterns fade quickly, but inside this range they can be very conspicuous.

colours to other species (less than 5m away), because the high contrast between the yellow and blue makes them very obvious. If they were viewed against the reef the blue makes them stand out, while against the background of

the sea, the yellow makes them more obvious.

The obvious colour patterns at close quarters makes an apparently contradictory camouflage at distances greater than 5m, because other fish cannot discriminate the patterns. The fish appear as a mixed combination of colours, merging with the background blue of the

DID YOU KNOW?

A Wrasse family is made up from several genus and therefore many species

Standing out from the crowd
The yellow and blue-striped wrasse are able to display their

DIFFERENCE OF VISION

Divers have noticed that the wrasse also use their behaviour to take advantage of their patterns. When threatened they hide amongst the branches of coral. While they are still visible to the human diver, they may not be to the other fish in the area. Seen from the side by other fish, the blue of the fish matches the blue of the ocean. The stripes break up the outline of the fish so making a very effective cryptic camouflage just by swimming among coral branches.



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D-Deltec Multi Compact MC500

This skimmer was specifically developed to help the vast number of people who want to successfully keep marine fish and inverts in small to medium tanks and is particularly suitable for Jewel Aquariums. Efficient skimming is essential for long term health and growth of aquarium inhabitants and therefore as with all D-Deltec skimmers the MC500 uses the patented 'Pin-Wheel' principle to provide unrivalled mixing of air and water, (drawing in more than 200 lts of air per hour).

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THE EYES HAVE IT!

For surviving and the survivor David Garratt gives us an insight into the important role of the 'eye'

Survival for any living creature depends on its ability to receive information from the environment. Fish accomplish this through the same five senses that humans possess but they also have an extra sensory capability that is denied humans, called electroreception, (although some would argue humans possess an undefinable sixth sense).

Some senses in marine animals may be acutely developed in a response to their way of life. For example it is often stated that one of nature's greatest predators, the shark, can smell minute amounts of blood from great distances. This acutely tuned sense, along with another well reported sensory ability enables sharks to locate injured prey over a very wide area.

For the marine aquarist the most obvious sense displayed by captive fish is sight. Indeed some fish have fascinating eyes; ask anyone who has kept a large porcupine puffer fish (*Diodon holocanthus* or *D. hystrix*). The depth and almost crystalline nature of the eyes as they catch the light must go a long way to explaining the affection we have for these fish. Scorpionfish (*Pterois Genus*) are another group whose eyes have a great depth of detail and colour.

Trigger fish have an eye defence mechanism to help them feed

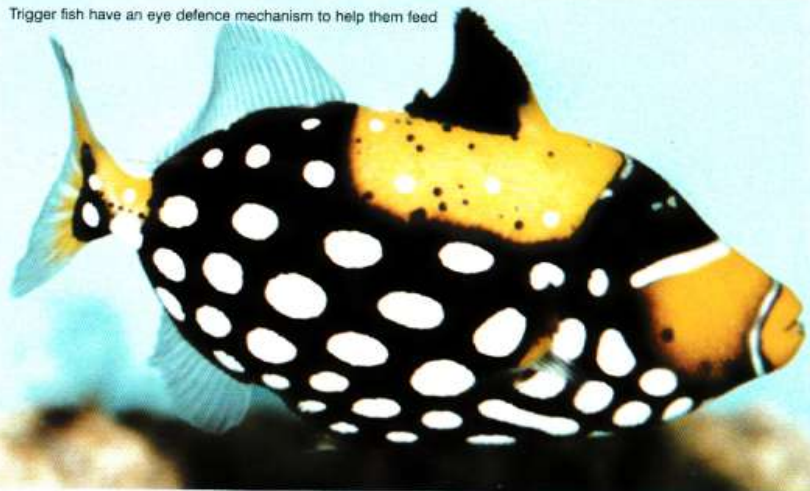


Photo by Iggy Tavares

CAPTIVE MARINE FISH CAN BE PRONE TO VARIOUS EYE PROBLEMS RANGING FROM DAMAGE CAUSED BY POOR HANDLING TO INFECTIONS

No tears

Although the eyes and how they function are basically very similar between fish and humans, there are a number of differences. Whilst some shallow water fish may have false eyelids to enable them to obtain protection from bright sunlight, the vast majority of marine fish do not have eyelids at all. Similarly, being immersed in a fluid environment they have no need for tear ducts.

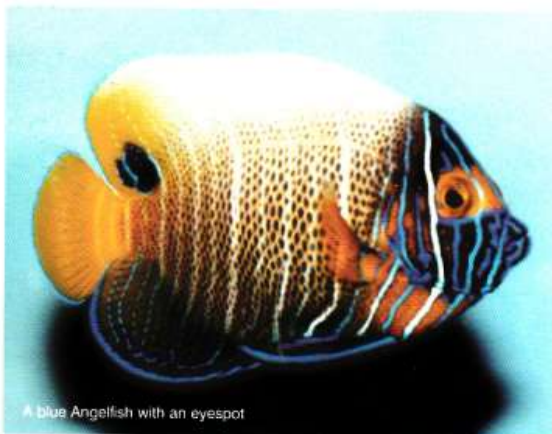
The lens of a fish's eye is round, meaning it focuses by moving the

position of the lens, as opposed to the disc-shaped human lens that focuses by altering shape. In addition to being able to perceive brightness and shade, fish are said to be able to distinguish colours, although deeper water fish do not need colour vision as light does not penetrate to any great depths.

What big eyes you have

Like humans, fish have two types of cells in the retina - rods and cones. Diurnal fish usually have an equal

number of rods and cones. Nocturnal fish generally have large eyes and will have far greater numbers of the more light sensitive rods. Nocturnal fish seen within the hobby include squirrelfish such as *Holocentrus Rufus* and *Diadema*, *Myripristis Jacobus* and *Murdjan*, and occasionally perhaps a species from the *Priacanthidae* family, (known quite descriptively as big eyes). Sharks have excellent low light vision, with some species having an adaptation in the form of a mirrored



A blue Angelfish with an eyespot

Damselfish need good vision to catch their small prey



T!

the 'eye'



The puffer fish has amazingly fascinating eyes

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layer at the back of the eye allowing light to be reflected back through the retina.

Plunged into a panic

Fish cannot adjust the size of their lens to allow for different light levels. The only way they can control the amount of light they receive is by moving to a different part of their habitat. This fact has a direct impact on the hobbyist and gives rise to the reasoning of turning the tank lights on in a staggered fashion as opposed to suddenly flooding the tank with all the lighting power at your disposal. A fish will have no protection or control over such a surge of bright light and is likely to panic, bolting blindly for cover and risking injury.

Sight - a matter of life or death

Fish use their eyesight to find food, seek partners and evade predators. All in all, very much as we would, except most of us would use our eyes to appreciate food as opposed to catching it! Not surprisingly in the vicious world of the coral reef it is the use of eyesight, in either a kill or be killed scenario, that is of paramount importance. Both the positioning of the eyes, and the ability to be long or near sighted, differs in different species and is linked to the

lifestyle of the species.

Most fish, including most of those found in our aquaria, have well-developed, slightly protruding eyes, positioned on either side of the head - an arrangement that gives them a very wide field of vision. This wide field of vision can be envisaged by anyone who has seen photographs taken with a fish eye lens. Whilst the photos look decidedly odd they do give an idea of the incredible nature of a 180 degree field of vision. Such an arrangement allows them to see things simultaneously on either side, allowing widespread scanning for predators.

Keep them well peeled

Unfortunately for the prey, fast moving predators such as marlin, jacks and tuna, also have well developed eyesight. Their eyes are set much more closely together to allow a stereoscopic imaging system giving judgement of distance and angle of approach when striking at prey.

The efficiency of the eyes and their positioning depends very much on environmental habits. For example, bottom dwelling flat fish have upward facing eyes for obvious reasons. Slow predators that take prey with a lunge, the Scorpaenidae

ALTHOUGH THE EYES AND HOW THEY FUNCTION ARE BASICALLY VERY SIMILAR BETWEEN FISH AND HUMANS, THERE ARE A NUMBER OF DIFFERENCES

family for example that includes the lionfish, need forward facing eyes positioned so as to give stereoscopic vision. Fish that take very small prey such as damsels (Pomacentridae family), pipefish and sea horses (both from the Syngnathidae family), also need a similar degree of very acute vision. Crustaceans such as the hermit crab can keep a watchful look out for predators by means of eyes mounted on stalks that can swivel, thus giving 360-degree vision.

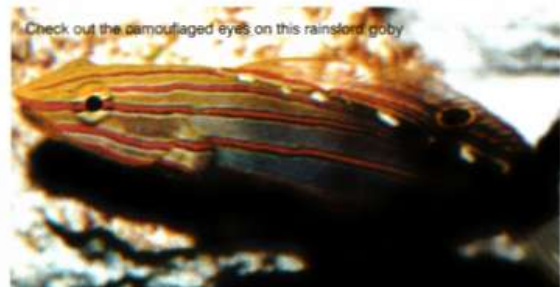
Defence mechanisms

Many marine fish have two aids to help protect the most precious of all their senses, and to protect

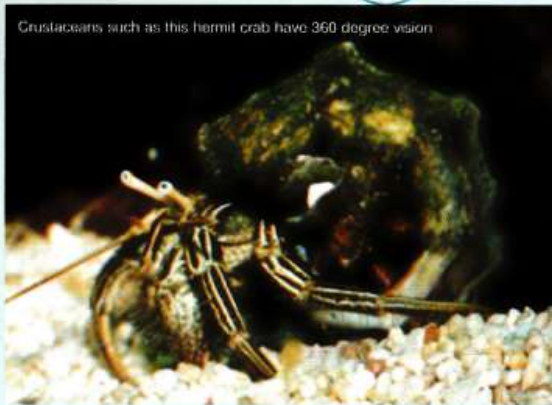
themselves against the strike of a predator - false eye spots and eye camouflage.

As their name would suggest false eyespots look like eyes but they are found far away from the real eye of the fish on a non-vital part of the body, usually to the rear of the fish.

A predator will home in on its target and the actual strike will always be aimed towards the eye or front of the prey. However, as with many butterflyfish, if the real eye is camouflaged and the false one prominent the predator will be wayward in its strike, allowing the butterfly to escape relatively unscathed. A second feature of these ►



Check out the camouflaged eyes on this rainforest gobby



Crustaceans such as this hermit crab have 360 degree vision

FISH CANNOT ADJUST THE SIZE OF THEIR IRIS TO ALLOW FOR DIFFERENT LIGHT LEVELS

false eye spots is that they are often larger than would be expected, so giving the impression of a larger fish and perhaps causing second thoughts for the predator. The oversized nature can also cause confusion for the predator with regards to its calculation of the striking distance to the targeted prey (Reference one).

Protecting the 'real' eye

Camouflage of the real eye is also seen in butterflyfish with many species having a dark vertical band passing straight across the eye and disguising it very effectively. In some marine fish the body colouration will be split in two with the split running through the eye and making for an effective means of camouflage.

Examples of these eye defence mechanisms can be found in many fish available in the hobby. The dragon wrasse (*Novaculichthys taeniarus*), Cuban hogfish (*Bodianus pulchellus*), black cap gramma (*gramma melacara*), neon goby (*Gobiosoma oceanops*), regal tang (*Paracanthurus hepatus*), lipstick tang (*Naso lituratus*), and the yellow long-nose butterfly (*Forcipiger flavissimus*) are just a few fish where the body colour can be seen to camouflage the eye.

False eye spots can be found in the butterflyfish of the *Chaetodon* Genus, the *C. auriga*, and *C. lunula* for example. Black bands running through the real eye can also be seen in the *Chaetodons* including the two fish just mentioned and others, such as *C. chrysurus*, *C. ephippium*, *C. falcula*, *C. collaris* and *C. vagabundus*.

Out of harm's way

Triggerfish have an eye defence mechanism specifically designed for the way they feed. The triggers have eyes set well back from their mouths, an arrangement enabling them to eat one of their dietary preferences, long spined sea urchins. They repeatedly pick up and drop an urchin back onto the floor until it lands upside down, presenting its soft mouthparts uppermost. The mouth is only surrounded by short spines enabling the trigger to dart in for the kill, with its set back eyes out of reach of the spines. These set back eyes coupled with the use of body patterns to disguise the eye can be seen in triggerfish such as the undulate trigger (*Balistapus undulatus*), clown trigger (*Balistoides conspicillum*) and the Picasso trigger (*Rhinecanthus aculeatus*).

Problems

Captive marine fish can be prone to various eye problems ranging from damage caused by poor handling to infections. Marine fish with large eyes like squirrelfish and puffers are at risk from careless handling, especially from the inappropriate use of poor quality nets. Any trauma to the eye can quickly be followed by bacterial or fungal infection. Prevention is easy in these cases as it is all down to the hobbyist.

Exophthalmia has long been associated with captive marine fish. The condition is caused by an accumulation of fluid within the eye. The excess pressure leads

to a bulging of the eye, giving rise to the common name of popeye. The condition can arise through a bacterial infection, often following damage to the eye. The condition can also be caused by gas bubbles developing within the eye, the reason for which is not entirely clear although severe stress and dietary deficiencies are often mentioned.

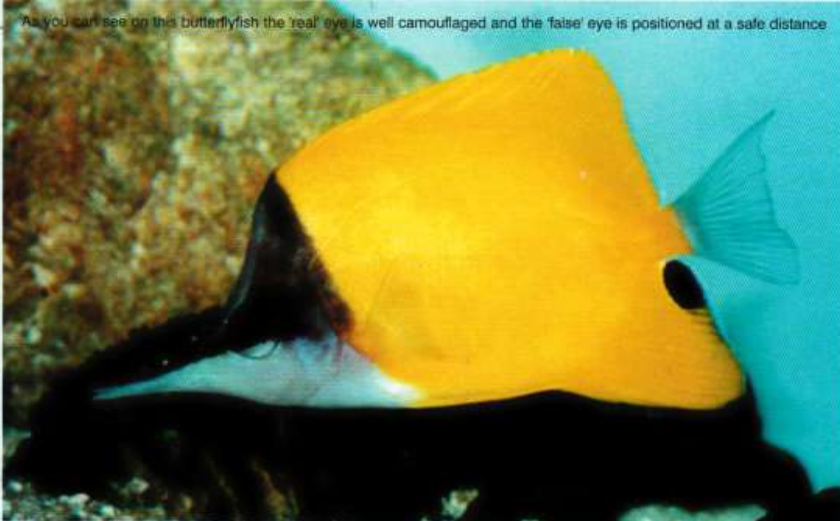
You are what you eat

Poor or incorrect diet has for many years been held to account for eye problems with many authors suggesting a vitamin deficiency as the culprit. Blindness is another outcome linked to poor diet. To help prevent these eye problems it is essential to feed a varied diet, including vitamin supplements. In addition ensure you are feeding an appropriate diet (for example plenty of greens to herbivores), a relatively easy task with the number of commercially available, specialised marine foods.

If your fish only has one eye affected it is probably the result of an injury becoming infected. However, if both eyes are affected the cause of the condition is unlikely to be so obvious. An infection, dietary problems, problems secondary to stress, or an internal disorder may well be the cause.

And finally

The green sunfish has an ability to detect polarised light. The effect of this is to enable it to see far better than humans can in dark and murky waters. Research in 1995 was being carried out by Professor Ed Hugh and Dr. Nadar Engheta (Reference two) in the hope of perfecting a device that could help us to drive more safely in fog or poor light. I have not seen any follow up to this research but it does highlight how quite humble creatures have a role in helping us supposedly 'superior' beings! [E]



As you can see on this butterflyfish the 'real' eye is well camouflaged and the 'false' eye is positioned at a safe distance

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Good Diet is everything

One area that has interested us for many years is the affect of long term nutrition on marine fish and invertebrates. Once a fish is placed in an established aquarium there is very little that should cause it harm or threat. Despite this we have always heard of fish in established well run aquariums that have suddenly developed disease or illness. A healthy fish has a vigorous immune system that allows them to fend off opportunistic pathogens and parasites. A fish that has slowly become starved of essential nutrition will have a compromised immune system and be open to disease. The case for more advanced nutrition to keep fish in top condition and allow them to live a full healthy life is an important one. In the wild a fish will consume a myriad of essential elements beyond simple proteins and carbohydrates. Complex sugars, vitamins, amino acids and fats will all play a part in keeping a fish fit, growing and with good colouration.

Reef Ration plus £10.99

For the last 4 years we have used this diet on our own fish with great success, the product has also been used extensively in marine breeding programs and for the keeping of specialised feeders. Reef Ration + offers the best nutrient profile and colouration properties we have found, the micro elements of this formulation keep fish in rude health and in spawning condition. We have used Reef Ration for everything from conditioning Seahorses to breed to feeding obligate coral eaters, along with Angel fish, Tangs and many others. All have benefited from this regime with enhanced colouration and growth. We are now able to offer this product in an easy to use reseal pouch.

Super Green £7.99 290ml pouch

Since we launched the Supergreen reef tank diet 3 months ago we have been very pleased with the positive comments we have received from customers on how well their corals look for feeding the tank. Supergreen is a unique formulation, offering multiple sizes of phytoplankton and amino complex to feed the broadest range of corals, micro life and filter feeders. We offer Super Green, either as a one off product or on subscription which is ideal if you live a long way away. We can ship fresh either monthly or fortnightly depending on stocking density and tank size we ship direct to your door.

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FUN IN MARINELAND

Iggy Tavares explores the wonder that is 'Marineland' in Palma Nova, Majorca

A brown striped red-banded seabream

Photo by Iggy Tavares



IThe island of Majorca, just off the coast of Spain is visited by thousands of British holiday-makers every year. For the most part, the British go to Majorca to relax in the sunshine and enjoy the Spanish food and drink, which is why our family took a mid-term holiday break in October 2002. One morning however, we did venture

out to Marineland in Palma Nova, in Southern Majorca. Expecting it to be small, in keeping with the size of the island, we were pleasantly surprised when we arrived, as there is much more to Marineland than just a couple of shows.

Tropical sea exhibit

On entering Marineland we climbed down the tunnel entrance to the Tropical Sea exhibits where three

THERE IS MUCH MORE TO MARINELAND THAN JUST A COUPLE OF SHOWS

sharks grabbed our attention as they patrolled their large 16ft square, floor to ceiling aquarium with views from three sides.

The sharks were black-tipped reefs (*Carcharhinus melanopterus*) four feet long; swimming among a shoal of bottom-hugging black

striped golden trevally (*Gnathanodon speciosus*) and another shoal of mid-water swimming silver coloured monos. A couple of large rock hopping blennies attracted my wife's attention and other colourful characters included several



A *Gnathanodon speciosus*



A yellow tang from the tropical sea exhibit

A green lizard can be found in the reptile house



ies of tangs, many yellow
s (*Acanthurus flavescens*) and
e powder blue tangs
Acanthurus hepatus).

that included the painted comber
(*Serranus pictus*), a lovely pair of
brown striped red-banded seabream
(*Pagrus auriga*), and some brown-

**THE REDEEMING FEATURE OF THE TROPICAL
FISH COLLECTION WAS THE FOUR LARGE
PIRANHAS IN ONE TANK**

Just a

erful information boards in
ish, among other languages,
est pictures and had
ormation on the 10 most
genus shark species including
black-tip reef shark, the great
re and the toothy tiger shark.
re questions cropped up such
why the sharks in the tank did
eat all the other smaller fish
whether these species were in
dangerous to man. Common
se told us the sharks were very
ed to prevent them eating
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ping from their small mouths it
difficult to see how reef
ies could be a big danger to
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k. In the half a dozen smaller
es that surrounded the
cepted display, one contained
veral clown fish cavorting among
eient anemone species - very
ntaining to watch.

Most pelagic Mediterranean species are just silver coloured - like these



Mediterranean sea exhibit

entire piece here was a large
square tank which went from
at height to ceiling. This tank
crowded with shoals of
Mediterranean species such as
ck-tipped bream (*Diplodus sargus*)
t *Spinus aurata*. There were a few
erful specimens in this tank

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striped (*Diplodus putazzo*). Since most pelagic Mediterranean species are just silver coloured, there was more to interest us in the smaller half dozen tanks that contained nearer to shore species.

A particular favourite was a family of brown spotted eels, possibly (*Gymnothorax kikkad*), taking refuge in some larger ceramic pipes with their heads and tails sticking out at either end of the pipe. A

small octopus in another tank, seemingly ready to spring into action, encouraged a lot of observation, but the octopus remained glued to its spot.

One wall of the Mediterranean Sea Exhibit made of glass gave us a view of the dolphins swimming around in their outside pool. The dolphins often came up to the

glass to view us and seemed on interaction.

Sea lions and the dolphin show

The naturally funny sea lions drew howls of laughter from the audience with their routine, especially when an upright sea lion did a close-up with its trainer on centre stage. Three seals performed acts that included balancing balls, diving out of the water to hit high-strung and catching hoops. A two-year seal pup, on the other hand, sat on its stool and used its back flippers to applaud every trick. The four-bottlenose dolphins ranged in age from eight to 24, with the youngest dolphin still to perfect all the performing skills.

The dolphin show was based mainly on power and speed and included various spinning leaps and hula-hoop tricks and even a chorus of whistling dolphins. One of the highlights of the dolphin show involved the trainer standing on the back of two dolphins and being tossed over a high rope. All the audience sitting in the low tier of course get wet when the dolphins did their leaps and splashes at the pool edges, but then that's part of the fun.

Other attractions

A large aviary separated into sections that could be entered through a beaded curtain doorway contains a selection of free-flying exotic birds including the performing macaws and other parrots. Outside, a large enclosure tank held some seals while another shallow tank contained several species of stingray. A large shallow pool home to a pair of crowned crane, possibly (*Boleoric regularum*) and a flock of pink flamingos, possibly (*Phoeniconaias minor*).

The pink flamingoes, although crowded in this enclosure, were well because one pair had actually bred and were looking after a large healthy baby still covered in grey downy feathers, filter feeding to its adults. There were also a few monkeys to see and photograph and macaws sitting on ones arms to

Parrot show

The parrot show was surprisingly run by a couple of Englishwomen. All the macaws and parrots in the show had been bred and hand-reared at Marineland, thus reducing the pressure on wild stock in the

JUDGING FROM THEIR SMALL MOUTHS IT WAS DIFFICULT TO SEE HOW REEF SHARKS COULD BE A BIG DANGER TO MAN UNLESS THEY ATTACKED IN A PACK



Fish Forum

Are you bursting to share your ideas, thoughts or comments with other like-minded enthusiasts? If you have something to say, don't keep it to yourself; write to us here at *Tropical Fish* and you could be in with a chance of winning fish food from Nishikoi Aquaculture Ltd.

STAR LETTER

SPECIAL STINGRAYS

Dear *Tropical Fish*

I couldn't believe it when I found the 'Special Feature' in February's issue on stingrays by Chris Ingham. I felt I should write to show my appreciation. It was such a coincidence as I have been looking into purchasing a stingray to join my collection of tropical fish and was after some 'top tips'. I have read various books and articles on stingrays but found this feature particularly useful since it highlighted important information that I could easily have missed in books and readings

elsewhere. I feel a lot more confident about keeping and caring for stingrays now and would like to thank your magazine for its guidance.

Lynn Cook - Aberdeen

Ed says

I'm glad the article was of some use to you - after all that's exactly what we're aiming for!

A QUALITY ARTICLE

Dear *Tropical Fish*

I found the article in last month's issue (March), on water quality extremely interesting. I suppose you would say I am a newcomer to tropical fish, having only kept

tetras for the past three years. I've always checked the quality of water in my aquarium, but I'm sure I've been doing something wrong as the water always looks murky, which must be unhealthy for the fish.

Having read your magazine - and particularly this article - I feel I have more knowledge on water quality and have started listening to your advice. I wanted to let you know that it seems to be working. My fish look happier (they always looked as though it was a struggle to breathe), and the water is certainly much cleaner. So, thanks for the advice. I'll be sure to continue reading your magazine

and improve my knowledge on tropical fish.

All the best,

Norman Wilkinson - Surrey

Ed says

As every fish keeper knows, water quality is of utmost importance. Keep a healthy environment for your fish. Good luck with your 'murky water' problem, and don't forget about the 'Ask the Panel' page if you have any questions for the future.

RIGHT ON YOUR DOORSTEP

Dear *Tropical Fish*,

I have lived in Dorset all my life and had no idea, until reading your magazine last month, that there were seahorses, cowfish and parrotfish just a few miles from my home. I don't keep tropical fish myself, which may explain my lack of knowledge, but a friend of mine has kept discus for several years now and knew this article would be of interest to me. I'm retired and although I don't think I will become a 'tropical fish keeper', I am certainly going to visit Chesil Beach and keep an eye out for this sea chicken. How extraordinary! I'll let you know if I spot it.

Bill Evans - Weymouth

Ed says

Why not take a camera along and see if you can snap it in action? Good luck with your quest!



A pair of young motoro stingrays - photo by Chris Ingham

Star letters

A newly planted aquarium can have water quality problems - photo courtesy of Java



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A LOSS TO THE WORLD OF FISH KEEPING

Dear Tropical Fish,

I was very upset to hear about the death of Derek Lambert - editor for Today's Fishkeeper. I read both Tropical Fish and Today's Fishkeeper avidly and have done for many years now. I know there is little you can say in this situation, but I felt the need to put pen to paper and show my appreciation of his work over the years. He will be greatly missed.

Ed says

As you say, sometimes words are not enough, but I'm sure his memory will live on for years to come. Thank you for your letter.

FISH ON THE MOVE

Dear Tropical Fish,

I'm just about to move house and the thought of moving my aquarium scares me half to death! I know how stressed out fish can become when being moved and although most of my fish are what you would call 'hardy' species, tetras, platies etc, I am still worried about their survival chances.

Also, and most importantly, I don't have a clue where to start. Would it be possible for you to write an article on this subject? Something quite step-by-step, as I need all the help I can get. Yours hopefully

Mr T Froggatt - Christchurch

Ed says

Thank you for your letter Mr. Froggatt. It is a tough enough job when you're

moving house anyway, let alone having to worry about your fish too. Keep your eyes peeled in our next issue - I'll see what I can do.

SOME FRIENDLY ADVICE

Dear Tropical Fish

I just wanted to warn other readers of something I discovered in my aquarium when I began adding flake food to the tank. Whether it was the smell, or something about the food that lead to my discovery, I don't know, but all of a sudden I found bristleworms living amongst the live rock. Any fish keeper will understand my concern towards this.

I was initially worried as to whether they may harm my fish,

but as far as I'm aware, they don't tend to be harmful. My advice to other readers would be to perhaps use alternative food in a bid to prevent bristleworms from appearing altogether, or simply just get rid of them when you see them. Gloves and a pair of scissors normally does the trick for me! I'm sure your magazine could offer more 'expert' advice on this subject (maybe an idea for a special feature?), but I hope this letter will put other readers at ease.

Thanks for a great magazine - keep up the good work.

Chris Johnson - Kent

Ed says

Thanks for the advice Mr Johnson - and yes a good idea for a feature, watch this space!

The Star letter each month will receive three fish foods from Nishikoi Aquaculture

This includes Cichlid Diet, a floating food with proteins and colour enhancers; Growth Food, a high protein colour enhancing mini pellet suitable for tropicals ranging in size and the Sinking Pellet, for catfish and other bottom feeders. So drop us a line here at the Fish Forum, Tropical Fish, Freestyle Publications, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ. Alternatively fax: 01202 733969 or email: reception@freepubs.co.uk - please try and include a photo if you can!



ASK THE PANEL

MEET THE TEAM



Dick Mills
is an expert on all areas of tropical fish keeping



David Garratt
is an expert on the husbandry of marines



Iggy Tavares
is an expert on cichlids



Gina Sandford
is an expert on all areas, especially, freshwater and breeding

OTHER EXPERTS

Stuart Thames
An expert on equipment & water quality
Rupert Bridges
Expert on fish diseases



Q TIME TO MATURE

Dear Tropical Fish

My Aquarium has been running for about four months now. However, every time I add more fish I lose the odd one and seem to have water quality problems. Why is this? I thought my filter would be mature enough after six weeks?

Regards **Mr S Peterson - via email**

A Dear Mr Peterson

Bacteria in Aquarium filters will only multiply to a level to process the biological waste created by the fish in the aquarium. This means that whenever you add more fish to the aquarium, the maturation process of the bacteria multiplying in number

must take place all over again. This is why you can get water quality problems when you add more fish. It is important to only add a single or small number of fish at any one time. If you are unsure then ask your aquatic retailer. I hope this helps?

Stuart Thames

Q PLASTIC PLANTING!

Dear Tropical Fish

I have recently noticed that the plants in my tank are disappearing and I have finally found the culprit - the fish! I sat and watched them for over an hour and sure enough saw them nibbling away at the vegetation. One of my fellow fish keeper friends suggested using plastic plants as she had the same problem. I'm not too sure about this as I like the nutrients that real plants supply and I think the plastic ones look awful.

Could you suggest anything that I could do to detract the fish's attention away from eating the plants?

Yours hopefully

Mrs Westwood - Notts

A Dear Mrs Westwood,

Many fish will browse on plants, as vegetation is part of their natural diet. For some fish plant material forms the whole of their diet and they will crop your aquarium plants to suit their needs. In order to curb their habits you need to provide them with suitable and more tempting alternatives - the easiest of these being lettuce leaves and frozen peas. Attach a lettuce leaf to a stone using an elastic band, the aim is to make the leaf stand up in the water column and then drop it into the aquarium.

Your fish will soon learn this 'plant' is a tasty morsel and will either nibble at it or graze on it depending on their method of eating. Frozen peas should be

Some fish keepers prefer a little extra help to kick start the filter system - photo courtesy of Interpet



nipped between finger and thumb to remove the seed coat and the soft inner portion of the pea can then be put into the aquarium. These sink to the bottom and are then eagerly consumed.

Careful choice of aquarium plants can also prevent them being eaten. Those with tougher leaves, for example Amazon Sword plants (*Echinodorus spp.*), *Vallisneria spp.* and *Cryptocoryne spp.*, can form the basis of your planting, with some of the quicker growing *Bacopa spp.* and *Hygrophila spp.* Added for contrast to help solve the problem.

However, take note, the fish will not leave the real plants totally alone. Many still browse over them often picking at any algal growth on the tougher leaves but not doing any serious damage.

Regards
Gina Sandford

Q A LITTLE OFF COLOUR

Dear Tropical Fish

In my community tank I have had some happy events as my livebearers have presented me with several new additions. Consequently I began feeding the tank with both normal flake foods and fry foods.

When I tested the water I noticed an increase in ammonia level so I did a 25% water change immediately and another the following day to reduce it. Since then, the fish seem off colour, even though I used water which had stood aerated over night and been treated with the usual additive for 'new' water. Help!

A concerned fish keeper



Star Q&A

The Star letter each month will receive a bottle of Special P from Dorset Discus, which treats 100 gallons of water. This is formulated to eradicate parasites, especially flukes and worms and also kills snails and can be used in fresh or salt water (without inverts). For more information contact Dorset Discus on tel/fax 01308 420747 or write to Unit 4, The Old Timber Yard, West Bay, Bridport, Dorset, DT6 4EL. Please include daytime telephone number or e-mail address.

Young fry should be able to cope with crushed up flake food - photo courtesy of Interpet



Dear fish keeper

Congratulations! First of all in becoming a multiple surrogate parent! With most of the cultivated livebearers - guppies, platies, mollies and swordtails - the young are quite able to take crumbled up flake foods right away, although a meal of brine shrimp or micro-worm won't be scorned.

The increase in ammonia is due to the increase in food supply, rather than an increase in waste products from the extra fish. You have been guilty of a sin all fish keepers fall prey to at one time or another - over-feeding. As a result decomposition of uneaten food has produced the ammonia.

The shock of the repeated large volume water changes will also be responsible for the fish feeling off-colour. Take things a little more slowly and things should settle down again.

Dick Mills

GROWING AND GROWING...

Dear Tropical fish,

I am at the stage now where my aquarium is ready to be stocked, but I have one problem. Eager as I am to get out and choose my fish (I have in mind what I want), I'm concerned about how much room there will be in the tank once the fish begin to grow. When I'm choosing young fish for the tank, how do I know what their potential adult/full size will be?

Yours sincerely

McGregor - Scotland

Dear Mr McGregor,

This is a good question, especially when you consider that without exception, all imported tropical fish for sale are juveniles. The better aquatic dealers often label their

display tanks with brief details about the fish within, but this service is sadly not a totally adopted one.

Most aquarium books will state the 'adult' size of species as found in the wild, but this may not always be attained in the aquarium. One of the best places to actually see fish at their probable aquarium adult size is to visit an aquatic society's open show. As the entries are awarded proportional 'points for size' most are fully-grown and you can easily see the 'monster' a loveable tiddler might grow into.

Again, the organising bodies behind these shows also publish lists of sizes of fish, (primarily for the show judges benefit), and these are avidly read by fish keepers so they know what the judges will be looking for in terms of size.

Dick Mills

WEIGHING UP THE PROBLEMS

My new aquarium has been placed on a flat floor, which when I measured with a spirit level was perfect. However, now it is full of

water it has tilted width ways so there is half a centimetre difference on the front to the back. The floor is strong enough to hold it, but is my tank safe or should I empty it and make it more level, as it is only a 5mm difference? Please can you answer my query as soon as possible as I don't want 125 gallons of water on the carpet if it poses a threat.

Mr P Sanderson - Chester

Dear Mr Sanderson,

Even though the water height difference is only 5mm, this is quite a lot based on the fact it is only over a distance of two feet. When you measured the level base it would not have had the approximate weight of 568kg of water affecting it, which is well over half a tonne. I would empty the tank immediately and check the stability of the tank support, both the floor and any cabinet.

The floor is the major concern, ideally it should be concrete and not have any carpet on it as any wood is likely to flex under half a tonne of water. The aquarium should only be situated across joists of a wooden floor to spread the load. The kind of weight this tank and its water generates necessitates a minor feat of civil engineering to ensure it is level and upright - if in doubt consult a joiner or builder. This size tank can be a problem, so I would advise setting it up right first time as later alterations, as you have found, can prove to be a headache.

Regards

Stuart Thraves

NEW PLANT PLAN

Dear Tropical Fish,

I would like to try the following plant in my community tank. Could you please give me some

information of its use, including cultural instructions of its care? The plant is called Ottelia alismoides and it comes from Australia.

Many Thanks

Miss Olivier - Manchester

Dear Miss Olivier,

You have chosen a very interesting species but the fact you had to ask about it indicates it is not commonly kept. The Ottelia genus has around 40 species but only two or three, including *O. alismoides*, are cited as being aquarium-suitable and this is still with some caution:

Although having a rhizome type root, propagation is not likely to be from runners extending from the rhizome. It is more likely that new plants will come from seeds set from flowers produced above the surface, although this is also unlikely in the aquarium.

Leaf shape varies with age - thin leaves come first with the speckled heart-shaped leaves following later. Successful cultivation depends on good quality loamy substrate, 12 hours or so of lighting with water temperatures around 20-25°C. Water quality should be soft and slightly acid, as hard alkaline water is reported to be detrimental to growth.

Additionally, the plant is very brittle and may not stand up to a community aquarium, especially if active fish are present or over-strong water currents are produced from filtration systems. However, if you can accommodate this plant in its own tank (it grows reasonably large), in peaceful conditions and supply the requirements outlined above, you should have a plant to be proud of.

Dick Mills

This fully grown gold spot pleco needs a lot of room to grow - photo courtesy of Iggy Tavares



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All about algae

Why does my tropical tank support not only my fish and plants but algae and weed too? What can I do to prevent this problem and how do I get rid of it? Gavin Beaumont shows us how

The first question is easy to answer because algae of many types grow in water almost anywhere. Leave a cup of tap water outside for a while and sooner or later it will go green and will probably end up a muddy brown mess as the water evaporates. The green colour is due to algae, which are carried as small dry spores in the air and just multiply furiously in untreated water. They won't grow in fresh tap water because that's been treated with chlorine which is the preferred biocide used by most water companies.

Different varieties

The variety of algae is enormous. There are literally billions of

different types and some of the more common are shown in this article (enlarged of course by the microscope). You will see from the illustrations that these algae are multi-cellular, but there are many more which are just single cells, roaming around on their own and totally responsible for themselves.

Some called flagellates, such as the Euglenids illustrated, have little tails and propel themselves around at great speed.

So with such a huge number of algal types and their amazing staying power, it perhaps isn't surprising that they end up in your tank uninvited and are quite hard

to remove. Tropical tanks are a greater attraction than tanks at ambient temperatures since water at 70°C is a very pleasant environment for roving algae.

Feed the habit

You can encourage them to stay and multiply by feeding them. One

and it is interesting to note that, although we call them all algae, some of them are almost bacteria.

Of the algae most commonly found, you will find brown algae grow in tanks that are in shaded areas, green algae, blanket weed and beard algae excel in brighter tanks and red algae seems to grow in any light. >

ALGAE - IT IS PERSISTENT AND WILL ALMOST CERTAINLY RETURN

of the main reasons algae love tropical tanks is the abundance of food. Not only do many of them photosynthesise but the fish excreta, ammonia from the gills and general fish waste are great sources of nutrient.

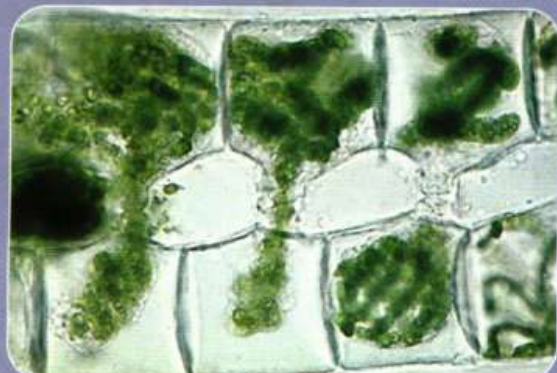
Some of the most common types of algae are discussed here



A good algae eater for the tank



Another form of blanket weed with long, green strands



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Water quality

Green algae

This is the most common type (millions of types don't forget), and will just grow under light. It just glues itself to the glass and restricts vision, in and out!

Hair algae

This is just another form of blanket weed (*Spirogyra Adnate*), which has long grey or green strands. It too thrives on light but also fish waste.

Green dot algae

Are round green dots that stick to the glass and grow faster in stronger light. This type of algae generally requires scraping off and even magnetic algae scrapers don't usually remove it. A razor blade is the real answer.

Brown algae

Also known as diatoms

DID YOU KNOW?
Excreta, ammonia from the gills and fish waste are great sources of nutrient

(*Bacillariophyta* is the generic name for diatoms). These are often the very first algae to appear in your new tank and as you can see from the illustration above, are a truly spectacular shape under the microscope. These wonderful organisms are amongst the most primitive found on earth and their fossil records show they have been around since the very beginning of life itself.

AVOID IF POSSIBLE PROLONGED SUNLIGHT AS ALGAE THRIVE ON IT

Their wonderful symmetric structure is made of silica and the fact that they often seem to be the first to appear in glass tanks could be that they leach some of the silica from the glass, sand and gravel or the silicates may come from tap water.

The ratio of Silica (Si) to Phosphates (P) is often higher in new tank water, which favours the growth of brown algae, but as the tank settles down and the silicate leaching slows down, the ratio then switches the other way and phosphates take over, favouring the growth of green algae. Nevertheless, brown algae

still photosynthesise, but do not like strong light. After the silicon phosphate balance has settled down the brown algae sometimes just disappear suddenly.

Red algae (*Rhodophyta*)

Also known as brush algae. These little chaps are more commonly found in the sea. Once again they are a complex organism and tend to bond together with 'microfibrils'. They are also tough

but their structure is calcium based rather than silicon as in the diatoms so they favour hard water. So, if the pH is high and your water is hard then look out for red algae. Although red in colour these algae also feed by photosynthesis and in fact the chloroplasts (the bit of the cell that is responsible for photosynthesis) are very similar to the blue-green algae.

Blue-green algae (*Cyanobacteria*)

Blue greens are actually bacteria but still come under the heading of algae as their behaviour is very algal-like - unlike most bacteria

they also photosynthesise sunlight. Of all the algae you might get in your tank, this one is probably the one that will cause the most problems. It is often seen as a slimy looking coat that covers plants and it can produce toxins which are harmful to fish.

Some blue-greens can fix nitrogen as well as photosynthesise, allowing them to grow with only light, water, a few minerals, and the nitrogen and carbon dioxide in the atmosphere. These rather spectacular algae can also grow in the most extreme conditions. They are the cause of the various colours in the hot springs of Yellowstone National Park and also grow under layers of ice in the Arctic.

Not surprising then, that your nice warm tropical fish tank makes an ideal home for one of the oldest organisms on earth and one incidentally that, since it produces oxygen by photosynthesis, was actually responsible for the bulk of early oxygen gas found on earth. Responsible then, for all life (that breathes oxygen anyway), and therefore, although a pest, something you should pay homage to as you wipe it away in your tank. It is persistent and will almost certainly return.

Brown algae - also know as diatoms



Red Algae will grow in any light



Algae management

As with any managed water, you are taking control of your tank and replacing nature. The problem with all tanks containing water and flora and fauna, is that the natural balance found in nature ceases to exist once we have decided to change the normal equilibrium. Too much food means too much excretion, too much ammonia and so on. Effectively therefore, whatever we do to disturb the normal equilibrium will itself result in some problem or other which then has to be dealt with. The secret then is to try to keep the balances as close to nature as possible.

As we have seen, the blue-greens can thrive on hardly anything requiring only light, water and gasses, so when we add extra nitrogen based compounds such as ammonia (NH₃), the algae thrive.

Food and light

The management of algae is therefore dependent on a 'food and light' balance and this together with some primitive items to remove them, such as scrapers and perhaps some algae eaters including specific fish, snails and shrimps. Your fish

supplier will normally tell you which algae-eaters are best, but there are a few well-known ones such as the Siamese algae eater and the catfish.

Avoid if possible prolonged sunlight as algae thrive on it. It is a good idea to provide a maximum of 10 hours light per day.

The food levels must be kept down. No matter how many times the fish keeper is reminded, the tendency to over feed both indoor

really a good idea to use algaecides (algae killers), either since they can kill live plants, mess up the bio-filters and are dangerous to many kinds of fish.

**Top Tips
Scrubbing**

Simple, but best done before water changes as the algae can be removed from the dirty water and free floating algae can be removed by filtration. Many people use razor blades and the ubiquitous magnet

pH balance

Very important to keep this between 6.5 and 7.5. Certainly the more alkaline the water, as we have seen, the more likely algae of certain types are to thrive.

Plant balance

If you have your plant balance right then the algae that compete for the same food will take second place. Dense planting is recommended and to promote growth you can inject CO₂ (Carbon Dioxide).

Finally

The more fish you have, the more you feed them, the less plants you have, the more algae you will get, so getting the balance right is important. Don't use chemicals and finally, ask your aquarist since his tanks are probably looking brilliant and he will know what to do to help keep algae under control. **FIN**

ALGAE OF MANY TYPES GROW IN WATER ALMOST ANYWHERE

and outdoor stock is always a temptation, resulting in extra algal growth, which just means more hard work.

The nitrogen cycle

The nitrogen cycle is a factor of any water environment and an external biological filter is a necessity for larger tanks while smaller ones can be put into smaller tanks. Remember to clean the filters out regularly and apply the golden rule, which is never wash out in tap water as the chlorine kills off the nitrifying bacteria. Use tank water. It is not

can remove most of the algae that cling to the glass.

Water changes

About 15% per week will cleanse the water of excess algae food.

Sunlight

As mentioned, not too much.

Feeding: do not overfeed

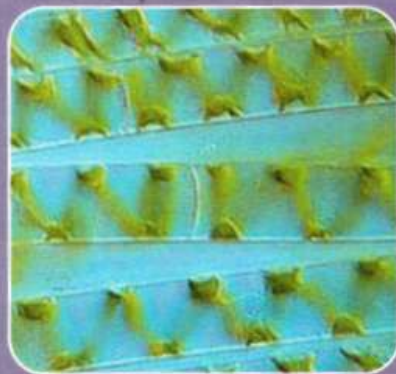
All you do is to feed the algae by producing excessive fish waste.

Filtration

Filter sand, gravel etc, and whether internal or external, clean regularly.



Like green algae, blanket weed will grow well with lots of sunlight



The dreaded green algae under the microscope



Competition

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Java is offering 12 readers the chance to win plants for either a discus or freshwater tank. On offer are six lots of freshwater '180 plant fish house collection' plants (£25 each) and six lots of '60 inch discus' collection plants (£24.95 each). So whether you have a discus or freshwater tank, just mark your preference on the entry form and send it in to the usual address. You can see full details of the plants included in these selections on Java's advert (page 75).

How to enter

Simply answer the question and send your entry form in by 22nd April 2004. Don't forget to mark your preference - either marine or freshwater, so we know which prize to send you.

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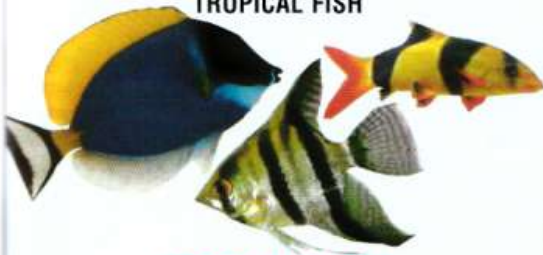
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SEND YOUR ENTRIES TO: Java competition, *Tropical Fish*, Freestyle Publications, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ.
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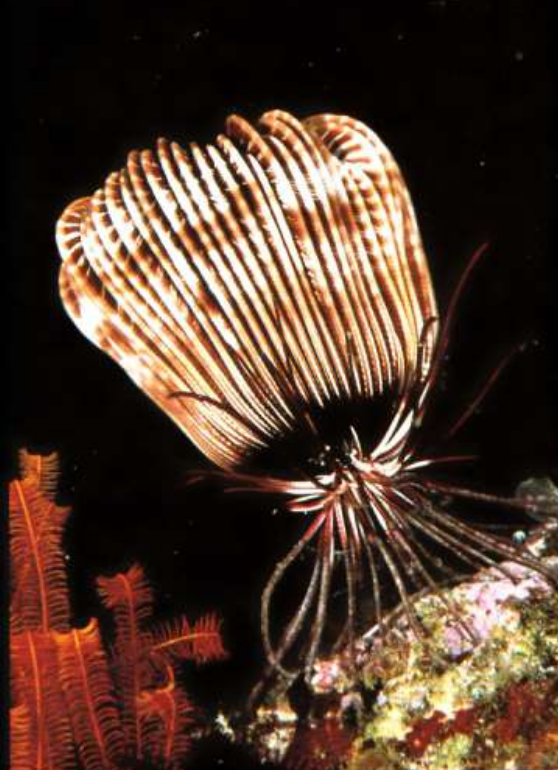


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A feather star clings to the reef



The crinoid shrimp takes on the colour of its host



off and swimming by flapping their feather-like arms until they reach a suitable place to settle for their adult life.

A welcome home

An apparent lack of predators, shelter and a steady supply of food make feather stars an attractive home for many other creatures. Clingfish, squat lobsters, shrimps and worms are amongst the regular residents that readily accept the benefits of a free food supply, shelter and protection. Hidden

away from sight and protected from their predators by the spiky arms of the feather star, they move up and down the ambulacral groove picking off small quantities of food. Despite their healthy appetite the quantity of food they intercept from its intended route is insignificant to the feather star.

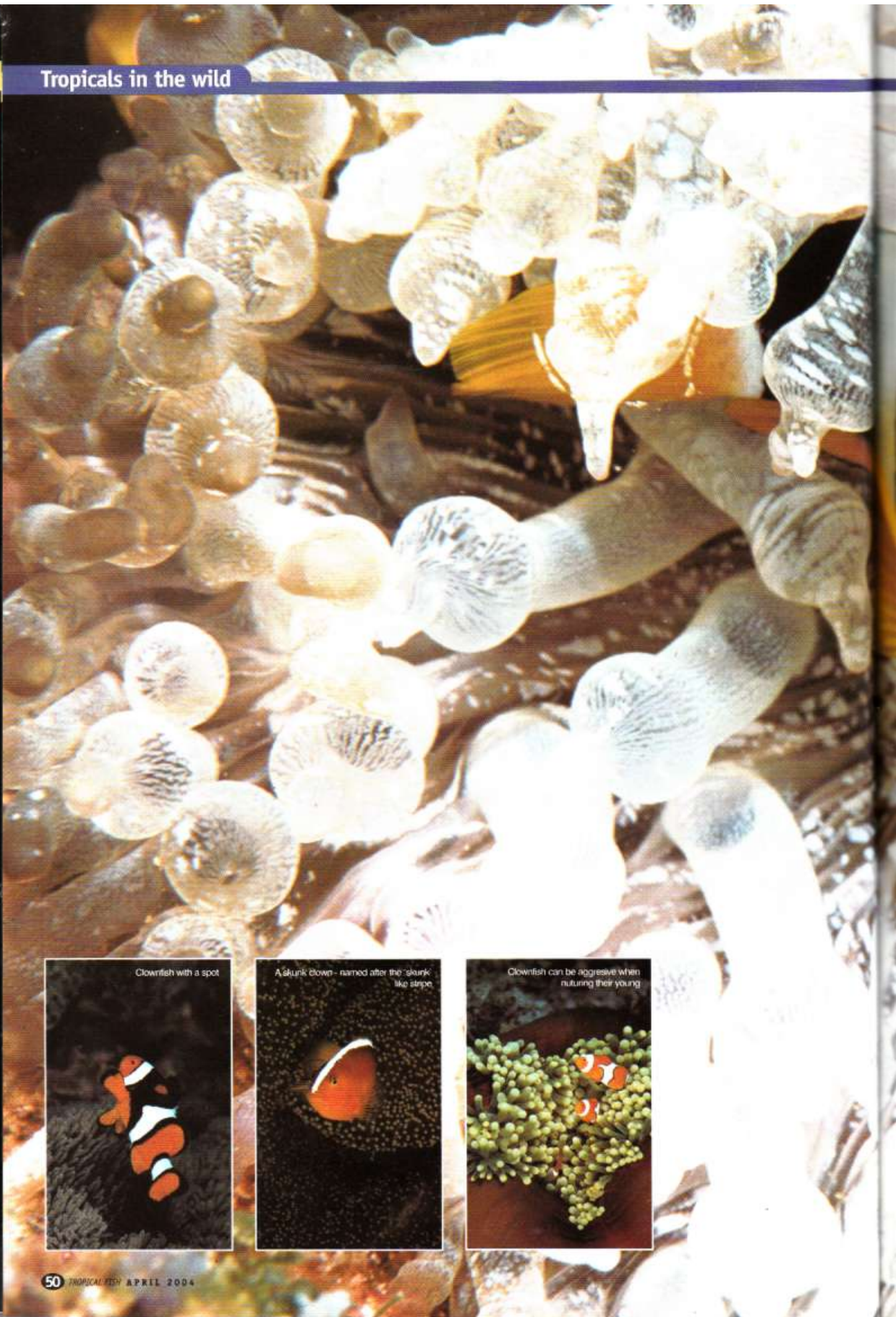
The colour changing shrimps

Commensal crinoid shrimps of the *Periclimenes* species, less than 2cm long, live amongst the feather star's arms having settled onto ▶

THE FEATHER STAR IS INDEED A GENIAL HOST



Hidden away at the base of the feather star a clingfish (*Ctenopoma*) hold on by means of abdominal suction pads



Clownfish with a spot

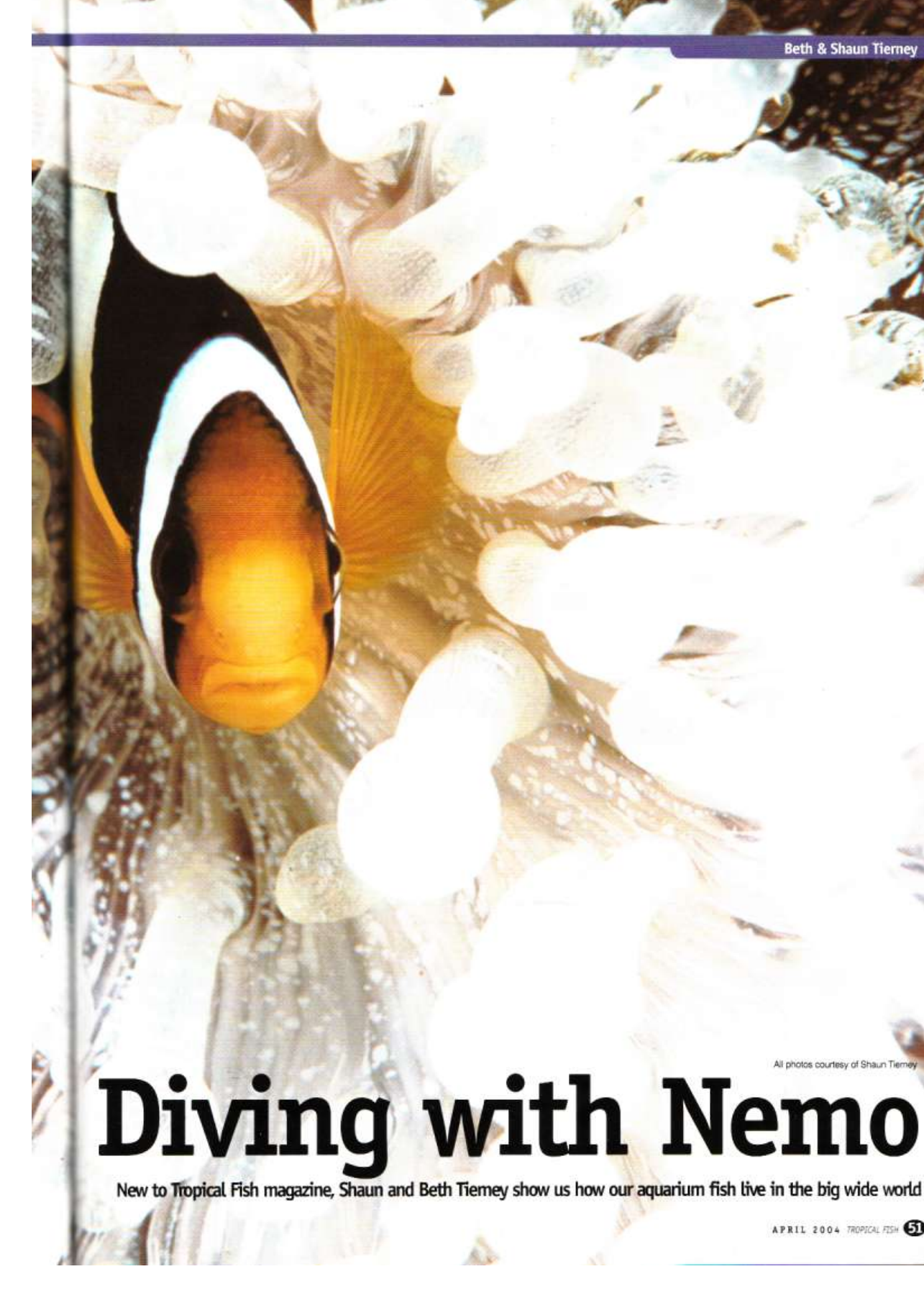


A skunk clown - named after the 'skunk' like stripe



Clownfish can be aggressive when nurturing their young





Beth & Shaun Tierney

All photos courtesy of Shaun Tierney

Diving with Nemo

New to Tropical Fish magazine, Shaun and Beth Tierney show us how our aquarium fish live in the big wide world

APRIL 2004 TROPICAL FISH 51

Tropicals in the wild

Sliding over the edge of the wall we are overwhelmed by the vista. As far as we can see the reef is simply magnificent. Pristine corals and masses of small fish flit about in bathtub temperature water. Rays of sunlight bounce back from untold depths to highlight a flash of bright orange. There on the edge of the wall, is a little Nemo dancing around a beautiful pink anemone.

Nothing quite brings a smile to your face like spotting a clownfish on a dive. Always a cheery sight, these curious creatures are fascinating to observe. But clown - or anemone - fish are not like Nemo! They may be small and cute but they have a temper, especially if it's a female with juveniles around.

Name, rank and serial number

Although we tend to call them clownfish, the proper name for most of these chaps is actually

The spinecheek belongs to the *premnas* genus.



ANEMONEFISH ARE FOUND IN MOST OF THE WORLD'S OCEANS, ALTHOUGH THE HIGHEST NUMBERS ARE CONCENTRATED AROUND THE INDO-PACIFIC REGION

anemonefish. A few do rightfully hold the title of 'clown' but most earned it as a nickname based on their markings and waddling gait.

Anemonefish are a subgroup of the damselfish family. There are two genera and around 28 species spread across the planet. While most are related along the Amphiprioninae

family tree, the spinecheek anemonefish belongs to another genus of damselfish - *premnas*.

Body shop

Rarely over 12 centimetres long, the anemonefish has a compressed, elliptical shaped body and a small

mouth with rows of tiny teeth. They are always colourful, coming in a multitude of warm shades from red to orange and all with some form of decorative body markings. The way to distinguish which one is which, is to study those patterns. A true clownfish -

THERE ON THE EDGE OF THE WALL, IS A LITTLE NEMO DANCING AROUND A BEAUTIFUL PINK ANEMONE

The bridled anemonefish



one of Nemo's family - will have a white ringed collar just behind his eyes, another around his tail and then a fascinating arrow shape around his tummy. Clarke's anemonefish, one of the more common on the reef, have a dark body with white warpaint stripes, while skunk clowns are named for the lone strip down their back.

Home patch

Anemonefish are found in most of the world's oceans, although the highest numbers are concentrated around the Indo-Pacific region. Out of the 28 different anemonefish there are, for example, 10 in Papua New Guinea but none at all in the Caribbean. Several locations, such as the Seychelles and Maldives have their own indigenous species.

No matter what sea they are in, anemonefish live in a close symbiotic relationship with their host sea anemones. As they have no inbuilt defence mechanisms they live permanently amongst the stinging tentacles of the host. It's thought that the fish can change hosts and can develop a tolerance to the variations in sting quality from one type to another by - darting in and out of the new host until they become immune. Out of the 1,000 plus species of anemone only, 10 or so have fish residents.

Bad attitude

While the fish seem to help the anemone by attracting food and keeping it clean, the benefit to the clown is obvious - security. At the first hint of danger, they nestle down into the safety of the swinging tentacles, only popping a nose out to see what's happening. But fingers beware! One of the great temptations for divers is to waggle a finger at these guys. Although they seem curious as they swim away from their anemone host, sometimes right up to your face, usually it's one bad-tempered little mama furiously defending her patch. She'll nip out and bite that finger faster than you can pull it away and before you know it there's a lump of skin missing!

This fiercely territorial behaviour is very typical. Although anemones can exist quite happily without their clownfish, it appears that they help to protect their host from

would-be predators. However, the clown is a little more self-serving than that. The more aggressive she is, the more likely that her male partner will be nearby minding a brood of eggs.

Sex and the single clown fish

Anemonefish have that delightful characteristic of being able to change sex. As the juveniles mature they turn into little lads,

NO MATTER WHAT SEA THEY ARE IN, ANEMONEFISH LIVE IN A CLOSE SYMBIOTIC RELATIONSHIP WITH THEIR HOST SEA ANEMONES

There'll be a gang of them all hanging around the Queen Mother and her consort - the oldest male in the group. As long as these two senior members are around, that's the way things stay. The babes remain 'sub-adults' until one of the adults dies and then

the next one down the chain moves into the vacant slot. And if that means changing sex, no problem, they just get on with it. The next batch of eggs are laid near or under the anemone to be fertilised, then tended and protected by the new senior male. ▶

Clownfish at home with its host the pink anemone



Snap happy

Of course these guys are favourites for underwater photographers. You can always rely on clownfish being where they are meant to be. No hunting and hoping for an interesting subject. The downside

though is that they never really stay still. They see the camera and that bad attitude kicks right in. Not only will they come and head-butt your mask (they can see their reflection and think it's another fish), they'll even zoom straight out and whack

the camera lens - and that makes it really hard to focus!

Meeting the relatives

We've hooked up with some very interesting anemonefish in our underwater travels. Like most seaside residents, there always seem to be new variations popping up. Just a few months ago we were diving in New Britain on a site

called Dickie's Place. This shallow volcanic bay was divided by a small coral clad ridge. The sandy seabed was the star of the show as all sorts of weird critters were in residence but our guide led us across to see a very unusual fish. No-one had seen another like it in the area - it was a variation on a true clownfish, but why that orange spot? It's certainly a unique feature and several well known scientists have made the trek to see her.

Friends and foes

Another curiosity out on the reef is the spinecheek clownfish. Nicknamed the maroon clownfish, or in some places the tomato clown, this chap is distinguished by the tiny spine below the eye that dissects that first white band. Unusually, they are possibly the darkest colour you'll see underwater, the maroon sometimes looking close to black. Photographing them is something of a challenge as they often lurk inside anemones that look fluorescent to the naked eye. In practise we know that they rarely photograph well, that dark skin absorbing all the light, or the pigments in the anemone turning murky on film.

All the shots featured here turned out well and who knows - do we have some more stars in the making. Maybe they'll appear in 'Nemo II, the Clownfish Fights Back'. **FM**

YOU CAN ALWAYS RELY ON CLOWNFISH BEING WHERE THEY ARE MEANT TO BE

A true clownfish

**ABOUT THE AUTHORS**

Shaun and Beth Tierney started diving not long after a round-the-world trek when they spent long spells in the tropics, floating on the surface but wishing they were down under with the divers.

Shaun's first career was as a studio photographer. Over the years, he was diverted by other occupations but has since returned to his first love and, in the last decade, being immersed wherever and whenever possible.

Beth works in marketing and as a consultant on the dive industry. Her editorial work covers both land and dive travel, marine biology and conservation. As a photo-journalist team, they have been published in magazines, newspapers, books, travel guides and on the internet.

For more information visit their website at www.seafocus.com



Photo by Malcolm Hey

The Think Tank

The monthly guide to advanced fish keeping

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WATER QUALITY

Dick Mills looks at nitrates in our waters

60

HEALTH

Rupert Bridges begins a series starting with the immune system



A GAME OF TWO HALVES

'Nitrates' can be a subject of concern for most fish keepers, so Dick Mills gives us some advice on keeping the balance right

Regular testing shows that in aquariums ammonia levels should peak first



To many newcomers to the hobby, 'nitrates' is another one of those mystifying bogey words that apparently every self-respecting fish keeper should fear. Of course, any unknown factor comes accompanied by fearfulness which may have been born out of ignorance. The only comfort that is usually bracketed with 'nitrates' is the fact that they are less toxic than some other substances - not exactly comforting to learn that there are even more dangerous things to worry about!

Pollutants

The very presence of any living organism in water threatens the cleanliness of the water - the

fishes' environment. For a start, oxygen is used up and the process of respiration leads to the release of carbon dioxide into the water, a fresh pollutant. Already water quality is going downhill. Add to this the fact that ammonia is also excreted from fishes' gills, and the problem is looking increasingly bad.

THE ONLY COMFORT THAT IS USUALLY BRACKETED WITH 'NITRATES' IS THE FACT THAT THEY ARE LESS TOXIC THAN SOME OTHER SUBSTANCES

Then we make things worse by providing food for the fish. Even if every scrap gets eaten and processed by the fishes' digestive systems, there is now the question of where the waste products go. Lying on the substrate and gently decomposing is the answer which again leads to oxygen consumption

and the production of more unwanted substances.

Naturally self cleaning

So why isn't this a problem in nature, you might be asking? Even the most modest water-course is probably far larger than our average aquarium and will, in all intents and purposes, have a permanently installed self-cleaning system, namely water flow. This water flow may not only bring food to the fish but it certainly would be equally instrumental in flushing away any

waste products produced. But this is not the scenario in the aquarium.

Nitrates are produced as a result of nitrifying bacterial activity. Aquatic wastes primarily break down into ammonia, a highly-toxic compound, which is then converted by Nitrosomonas bacteria into nitrite. Itself also toxic but slightly less so.

Along comes Nitrobacter bacteria and promptly converts the nitrite into the safer, end-product nitrate.

How is this process encouraged?

Any surface in the aquarium can play host to millions of bacteria. Nitrosomonas and Nitrobacter thrive in oxygenated water, and a special colony of both can be encouraged by installing the familiar biological (or undergravel) filter. It is preferable to refer to this filter as biological, as there is absolutely no need for it to be installed under the substrate.

PLANT FOOD

It is a popular theory that plants' favourite food is nitrates, so your aquarium should soon be overgrown with luxuriant plant growth. Readers won't need to be fortune-tellers to know what's coming next - your tank's overgrown alright but with algae, not exactly the plant growth you had in mind! But before you lay the fault at nitrate's door, it may be that your phosphate levels are high too. Worth checking. Incidentally, a surfeit of nitrate can in some species cause plants to die back.

Biological power time. Sipora

First time newco need t filter l Over a tasting level p nitrite events nitrite the ni indica matun not irr to its fish, b that t the in No condit have i lesser appar increa can tl are th aquar left u

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A heavily planted aquarium - nitrates are plants' favourite food - photo courtesy of Darren Slater

NITRATE ORIGINS

So where do these 'bad guys' come from? You can almost imagine the black-hatted nitrate gang riding into town to bust up the Golden Nugget Saloon. Continuing the analogy just for a moment, nitrates are only part of a far larger gang which perhaps ought to be labelled the decomposition mob, or the wastes gang.

a chance to decompose? In this way, you'd be taking away nitrate's building blocks.

Matter removal

Protein skimming removes organic matter from the water by foam fractionation. Organic matter is particularly fond of gathering at any water/air interface - water surface, aeration points etc. The masses of tiny bubbles generated by the protein skimmer gathers up the organic matter and deposits them in a collection cup from where they can be disposed of. So far so good.

The next important ally in nitrate removal is living rock. You will notice that deep substrates are no longer de rigeur in marine systems. Living rock works in two

'Biological filter' conditions will become established in any external power filter's filtration medium in time. Filling such a filter with say, Siporax will create an ideal system.

First things first

Newcomers should be aware of the need to slowly mature the biological filter before stocking the aquarium. Over a period of weeks, regular testing will show that the ammonia level peaks first, after which the nitrite also reaches a maximum and eventually, after both ammonia and nitrite levels have fallen to zero, the nitrate level slowly rises indicating that the filter bed is mature. At this stage, you should not immediately stock the aquarium to its theoretical full capacity of fish, but build stocks up slowly so that the filter can keep pace with the increasing bio-load of wastes.

Now let's take this set of conditions to its extreme. Here we have an efficient bacterial factory lessening the toxic substances but apparently turning out an ever-increasing pile of nitrates. How can these nitrates be reduced and are they a threat to the aquarium's conditions if they are left unchecked?

Staying safe

If you're familiar with the nitrogen cycle process, you're now at the halfway stage, so how do we maintain nitrates at a safe level? Another bacterial activity can solve this problem. The good guys in this case are de-nitrifying bacteria, Pseudomonas which live in totally

opposite conditions to the nitrifying bacteria described earlier. These bacteria live in anaerobic conditions where there is little oxygen. When feeding they require a supply of oxygen and extract it from the nitrate, thus converting it first into nitrous oxide N_2O and then to atmospheric nitrogen N_2 . This is the process that occurs in de-nitrator units where the bacteria live under very strictly-controlled conditions and require very precise doses of food in order to carry out their important function.

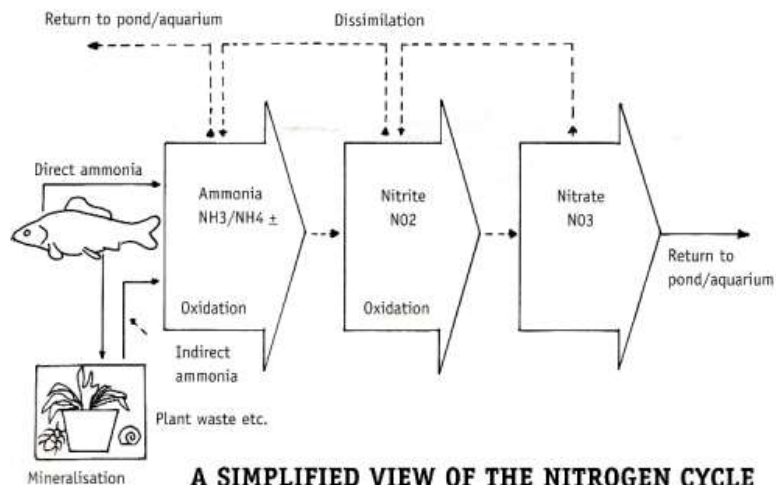
Generally, in any type of aquarium set-up, nitrate levels are controlled by carrying out regular, partial water changes.

Managing marines

Although the previous processes and aquarium management practices might have been assumed to be pertinent to freshwater tanks, they are also equally relevant to marine systems, although here things can be managed a little differently.

It follows that if all this nitrate problem stems from decomposing organic matter, wouldn't it be better to remove this organic matter before it gets

GENERALLY, IN ANY TYPE OF AQUARIUM SET-UP, NITRATE LEVELS ARE CONTROLLED BY CARRYING OUT REGULAR, PARTIAL WATER CHANGES



A SIMPLIFIED VIEW OF THE NITROGEN CYCLE

IMMUNE SYSTEMS

Rupert Bridges begins a health series to help us understand how to prevent disease before it strikes - we begin with part one, looking at the immune system



Stomachs are one of the barriers to infection that act to prevent pathogens from entering the fish (unfortunately barbs have no stomach!)

All photos courtesy of Iggy Tavares unless otherwise stated

Rather than limiting ourselves to specific health problems, (although these will be covered) in this new series on fish health, we will be looking at the wider picture - including how fish deal with infections, why they become ill and how we can manage their environment and care to reduce the chance of problems

LET'S START AT THE BEGINNING, WITH A LOOK AT THE MECHANISMS FISH HAVE TO PREVENT AND DEAL WITH INFECTIONS

occurring. This is because, regardless of the specific problem and its treatment, preventing illness in the first place is always preferable. Doing this effectively depends on how much we know and understand

about the process of infection, what facilitates it, and how fish attempt to deal with it.

Begin at the beginning

Let's start at the beginning, with a look at the mechanisms fish have

to prevent and deal with infections. If these are working correctly, the likelihood of a problem occurring is reduced. If they are compromised by environmental or physiological problems for example, the risk increases.

Broadly speaking, the defence mechanisms available to fish include physical barriers to infection, the non-specific immune system, and the specific immune system.

Crown loach are susceptible to whitespot due to their reduced scalation.

Some a

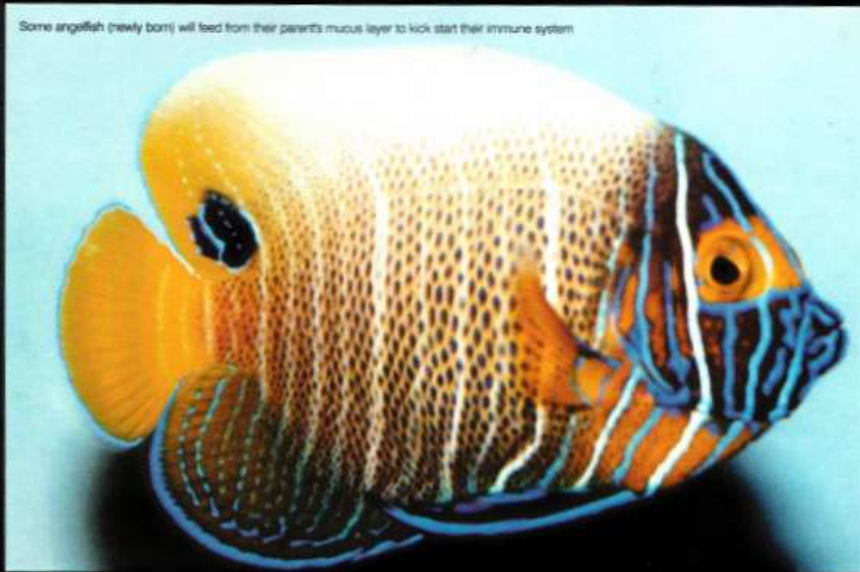
Physical

There are barriers to prevent pathogens from entering fish. The mucus, stomach and gills are between the water and the fish - for example, barbs reduce the surface area forward, increasing the risk of infection.

The skin and scales are a physical barrier.

Mucus

Some angelfish (newly born) will feed from their parent's mucus layer to kick start their immune system



Physical protection

There are a number of physical barriers to infection that act to prevent pathogens from entering the fish. These include the skin, scales, mucus, wall of the intestine, stomach, and so on. Differences between species of fish are apparent - for example, some lack stomachs (barbs) and scales (catfish). Indeed, reduced scalation is often put forward as an explanation for the increased susceptibility of clown loach to whitespot.

The mucus layer that covers the skin and gills of fish is important as a physical barrier to trap

pathogens, and it often thickens when the fish is under attack from large numbers of these, hence the common name of 'slimy skin' for some parasite infections. If the mucus layer is damaged through handling or aggression from other fish, the chances of infection are increased. This is why products that repair this layer with colloid coatings, AquaSafe for example, are especially useful when

transporting fish or carrying out larger maintenance jobs on the tank. Some newly born fry such as discus and angelfish, feed from their parents' mucus layer. This may help to 'kick-start' their immune system.

As well as providing physical protection, many of these 'barriers' also have an immunological role, acting as sites where various functions of

THERE ARE A NUMBER OF PHYSICAL BARRIERS TO INFECTION THAT ACT TO PREVENT PATHOGENS FROM ENTERING THE FISH

Mucus layers will often thicken when fish come under attack from pathogens - photo courtesy of the author



WHAT DOES IT ALL MEAN?

Non-specific immune system

The non-adaptive part of the immune response, which reacts in a similar way to all pathogens.

Specific immune system

The part of the immune response that adapts to specific pathogens in different ways.

Pathogen

Anything that has the capacity to cause disease.

Colloid coating

A layer of very small, evenly distributed particles that do not settle or dissolve rapidly. Artificial colloid layers can replace the mucus covering of fish temporarily.

Immunological

Relating to immunity.

Disease

An abnormality of the fish, usually caused by a pathogen, nutritional deficiency, or environmental parameter.

Lymphoid organs

Areas where lymphocytes and other cells relating to the immune system are produced or aggregated.

Lymphocytes

Types of white blood cell that are primarily involved in the specific immune response.

Thymus

Primary lymphoid organ in fish, where lymphocytes are produced.

Lymph nodes

Discrete masses of lymphoid tissue where antibodies are produced. Not found in fish.

Cestodes

Parasitic tapeworms that have quite complex life cycles involving more than one host.

Granulomas

Inflammatory lesions containing phagocytes.



the immune system can be carried out. If physical barriers are broken or damaged, the likelihood of infection increases.

Fish immune system

If pathogens manage to enter the fish, they have to be dealt with

quickly and effectively to avoid disease. The immune system is a complicated mechanism, consisting of numerous types of white blood cells (leucocytes), and various substances that complement their action. Leucocytes are produced in lymphoid organs. In fish, the

primary lymphoid organ is the thymus, where lymphoid cells develop into lymphocytes - white blood cells that are involved in

the specific immune response. Secondary lymphoid organs, where circulating white blood cells may aggregate during an infection,

IF PHYSICAL BARRIERS ARE BROKEN OR DAMAGED, THE LIKELIHOOD OF INFECTION INCREASES



include the spleen and kidney. In addition, there are diffuse aggregations of lymphocytes and phagocytes found throughout the gut, gills and mucus layers. Fish do not have either bone marrow or lymph nodes, which are important lymphoid organs in mammals.

Non-specific immune response

The immune response to an invading pathogen may be non-specific or specific. As the name implies, non-specific involves a similar set of cells and substances regardless of the pathogen, whereas specific refers to a response that is unique and adapted. The cells of the non-specific response are at the fish's disposal all the time, unless there is a physiological problem.

Cellular defences

The principal cells involved in the non-specific immune response are phagocytes (principally macrophages and granulocytes), eosinophilic granular cells (EGCs), and non-specific cytotoxic cells (NCCs). Phagocytes are the key players and they work by engulfing pathogenic cells and destroying them.

When the fish is infected, chemical signals attract granulocytes to the area of the infection. These chemicals may be derived from the fish or the pathogen. For example, *Sharp et al (1991)* found that the cestode *Diphyllbothrium dendriticum* produced a chemical that speeded up the delivery of cells to the point of infection, whereas the infected fish produced chemicals that directed the cells to the right place.

Varying types

There are different types of granulocyte, but neutrophils are usually the first to arrive (accumulating within an hour). They immediately begin mopping up any unwanted cells and micro-organisms. This process is

facilitated by an increase in blood flow to the affected area, and increased permeability of the capillaries surrounding the site to allow phagocytes to move out of the blood supply and into the affected tissue. Following this monocytes begin appearing, which turn into macrophages at the infected site. Macrophages are more important in cases where the infection persists, as they remain at the site for longer. Lymphocytes may also be mobilised to the area.

In such chronic cases, granulomas may form around the infection, or in the case of protozoan parasites the tissue may encapsulate the pathogen. The white spots seen in whitespot infections are the result of encapsulation of the parasite. This whole process is known as the inflammatory response, and it is key to the non-specific immune response.

Humoral defences

The cells that are involved in the non-specific response may be helped by a range of other substances. These include 'complement', lysozyme, C-reactive proteins, lectins, transferrin, anti-proteases, interferons, and eicosanoids. These generally work in conjunction with the white blood cells to inhibit the spread and growth of the infection.

Anything that affects the integrity of the non-specific immune system or physical barriers to infection will increase the likelihood of infection. Much work has been done on factors that affect the non-specific immune system, and it is an area of current research for major aquatics companies. In the coming months we will look at what affects the ability of the immune system to do its job, and how we can keep it working efficiently. Next month we will conclude our review of the fish immune system with a look at the specific immune response. **FIN**

WHAT DO THEY ALL DO?

Leucocytes

Collective term for white blood cells - the large unpigmented cells that provide defence against invading pathogens.

Phagocytes

Types of leucocyte that engulf and destroy invading pathogens. Include macrophages and granulocytes.

Macrophages

Type of phagocyte which mops up debris and unwanted cells around infected sites. They also mop up old red blood cells.

Granulocytes

Types of leucocyte that possess granules in the cytoplasm. They work via phagocytosis. There are three different types of granulocyte - neutrophils, basophils and eosinophils.

Eosinophilic Granular Cells

White blood cells that occur at mucus membranes, such as the gut and gills.

Non-Specific Cytotoxic Cells

Equivalent of human 'natural killer' cells. Able to 'lyse' (rupture) unwanted cells. Shown to be toxic to various cells and protozoan parasites in studies on catfish.

Neutrophils

Type of granulocyte. Generally they are first to arrive at the point of infection, and start mopping up invading cells.

Monocytes

Cells that migrate to the site of an infection and then develop into macrophages.

Complement

Proteins that mediate and aid the inflammatory response by either targeting certain cells for destruction, or destroying their membranes.

Lysozyme

Enzyme that breaks down bacterial cell walls. Found especially in mucus layers.

C-Reactive Protein

Bind onto pathogens and make them more vulnerable to phagocytosis.

Lectins

Proteins that occur in the mucus and act as a barrier to infection.

Transferrin

Form of protein that binds iron. Micro-organisms need iron to grow, and so transferrin helps to limit their development.

Anti-proteases

Act to inhibit protein-destroying enzymes secreted by pathogens.

Interferon

Proteins that protect against viruses.

Eicosanoids

Released by certain white blood cells. They increase the inflammatory response and help to attract and improve the function of certain cells.

FISH DO NOT HAVE EITHER BONE MARROW OR LYMPH NODES, WHICH ARE IMPORTANT LYMPHOID ORGANS IN MAMMALS

JOURNEY THROUGH THE PLANTED AQUARIUM

Our new plant expert Darren Slater begins a series on planting the perfect aquarium. This month he maps out the journey and gives us a taster of what's to come...



Photos supplied by the author

Within the forthcoming issues of *Tropical Fish*, the plant page will be taking a journey that follows many different paths but leads to the same destination. They will all contribute to the same result, which is a complete living masterpiece in your home. I will attempt to navigate the way through the various aspects of achieving a healthy aquatic garden which is truly pleasing to the eye.

Issue by issue I will take you closer to completing what you will consider to be your masterpiece, while bringing a mass of creative ideas which will open your eyes to the world of aquascaping. It will give you a different perspective in the way you look at and understand your aquarium.

Over each month I will introduce all aspects affecting the water quality that needs to be attained for such an aquarium and ways to hold and maintain the parameters within their desired boundaries. I will also explain how to prevent problems before they happen.

ISSUE BY ISSUE I WILL TAKE YOU CLOSER TO COMPLETING WHAT YOU WILL CONSIDER TO BE YOUR MASTERPIECE

Begin at the beginning

You have a nice new aquarium or maybe a planted tank, which you want to take to another level. Before starting with the plants some of the following points are very important in achieving the right conditions for good plant growth and therefore need careful consideration.

- Filtration and circulation
- Lighting (with emphasis on the importance of the colour spectrum

and duration of time)

- Carbon dioxide (no matter for debate - you need it!)
- Substrate (I will make it plain and simple for you to create your own path on this matter. It is a very complex issue which I will try to simplify over the coming months).

Water quality

Moving on we now need to tackle the issue of water quality. From the



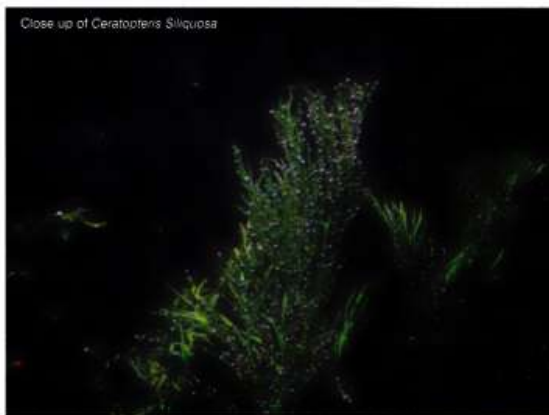
Mystic dream - Aquascape by Darren Slater using both high and low light plants creating an illusion of depth

FROM THE MOMENT YOU ADD WATER TO YOUR AQUARIUM YOUR MAIN CONCERN WILL BE WITH WATER QUALITY AND CONTROL

moment you add water to your aquarium your main concern will be with water quality and control. This involves strict control over all substances entering the aquarium (including ornate objects). I will be answering your questions about the conditioning of your tap water and showing you ways of achieving the necessary results.

Plants and their environment
Over the next few months we will

begin to learn how important the surrounding environment is to our plants (alleopathy) and the way that the environment actually works for and against our aquarium eco system and its inhabitants. In the plants and their environment we also need to look at their positioning and their alleopathy, but before we do that we must first obtain our starter plants. These play an extremely important role in the initial cycle of the aquarium for



Close up of Ceratopteris Siliquosa



Dancing in the valley - from a different angle you are able to see the formation of the planting technique which is a terrace style layout

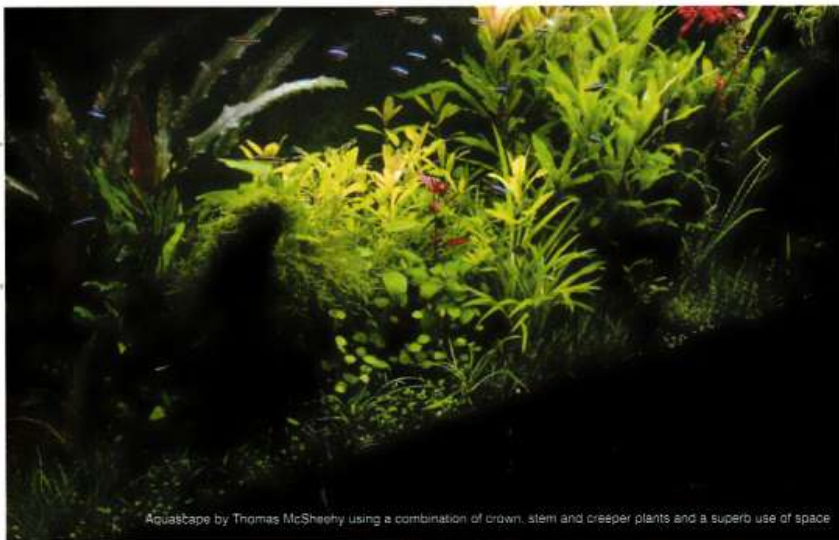


Mystic stream - Aquascape by Darren Slater. More species added and a more mature tank.

their anti algae and water purifying qualities. I will also go into detail about the balance and addition of nutrients, with prevention of algae

in mind. Propagation and shaping of your aquarium plants is also a matter which will be covered in-depth over the following months.

INSPIRATION IS THE MOST IMPORTANT FACTOR IN CREATING YOUR AQUATIC GARDEN AND ACHIEVING RESULTS THAT YOU CAN BE PROUD OF



Aquascape by Thomas McSheehy using a combination of crown, stem and creeper plants and a superb use of space

Creative ideas

Inspiration is the most important factor in creating your aquatic garden and achieving results that you can be proud of. Your project will turn many corners and open many doors. From start to finish the overall scenery and species of plant will no doubt change, constantly pleasing the eye and providing a challenge.

What's to come

The next instalment of this article will take you through equipment, choices of substrate, water quality/control and some aquascaping tips along with the regular plant focus.

Meanwhile enjoy the photos which will start you on your journey through the planted aquarium. **FIN**

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WHAT'S CREEPING AROUND IN YOUR TANK?

This month plant expert Peter Hiscock looks at the 'Creeping Jenny'

For the first of my 'plant of the month' features I have chosen a personal favourite, which sooner or later ends up in almost all of my tanks. The Creeping Jenny, or Moneywort *Lysimachia nummularia*, is an extremely versatile plant with a very pleasing and distinctive appearance.

Origins

Creeping Jenny is naturally found in ditches and marshy areas around Europe and Japan, and some American states. Although used as an aquarium plant, it is best suited to above water conditions at the edges of ponds or as a palludarium plant in the aquarium. Grown at the edges of

ponds it will creep along the ground and overhang into the pond forming a dense mat of vegetation. If



Lysimachia nummularia 'Aurea'

THE CREEPING NATURE AND MINIMAL SUBSTRATE REQUIREMENTS OF THE PLANT MAKE IT IDEAL FOR USE IN SMALL WATER FEATURES

Lysimachia nummularia



carefully placed, it is ideal for covering pipework or exposed edges and will grow in relatively small amounts of substrate.

The creeping nature and minimal substrate requirements of the plant make it ideal for use in small water features. In many cases I have simply 'wedged' small specimens in cracks between bare rocks, cobbles or boulders around ponds then sat back and watched a few square feet of bare surface become covered by lush vegetation.

In the summer the plant produces numerous yellow 'buttercup' style flowers, which remain for the rest of the season. The plant is also an evergreen, so will provide a bit of greenery throughout the colder seasons. In fact, Creeping Jenny will start growing quite early in spring and is one of the few good quality pond plants available right from the start of the season. Once the plant is well established cuttings can

regularly be taken and replanted in damp soil where they will soon root and spread.

Aquarium behaviour

In the aquarium the plant will grow upright, often producing roots from the leaf nodes, and is best given plenty of light and space to avoid competition from other plants. A rather nice variety *Lysimachia nummularia 'Aurea'* is the most common form sold as an aquarium plant. 'Aurea' has light green-golden leaves that contrast well with other aquatic plants.

Although Creeping Jenny will grow well in the aquarium and adapt to a wide range of conditions, it is really suited to cooler environments above water and it often has a limited life underwater. Replanting cuttings from the top quarter of the plant when growth slows or stops will

ensure that your specimen lasts as long as possible. In terms of water conditions, substrate and even CO₂, Creeping Jenny has no demands and is ideal for low-tech aquariums or for aquarists who prefer to concentrate on the fish rather than the plants. Providing you have no destructive goldfish, Creeping Jenny is perfect for the coldwater or temperate aquarium where it will appreciate the cooler conditions.

Suitable for all

For aquarists who have ventured into the extra dimensions of palludarium-style aquaria with above-water sections, Creeping Jenny is a brilliant plant. The plant will root in porous rocks such as lava rock or any moist cracks and crevices where it will creep down a rockface before turning to grow upright towards a light source. Creeping Jenny truly is a versatile plant for all environments. **RM**

DID YOU KNOW?
Creeping Jenny is a non-native invasive plant in many American states

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Pete the Piranha



Pete the Piranha

has bitten off more than he can chew this month and is running scared. He's lost somewhere in the magazine and we need your help to find him. If you spot Pete, write down his location and send it in. The first entry drawn from the hat that knows where he is gets a FREE subscription to Tropical Fish.

All entries to Pete the Piranha Tropical Fish, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ.

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Clubs and societies

Club scene

News from societies around the country



The club pages are here to help foster a sense of community and to keep everyone in touch with what is going on in the national club scene – from weekly meetings to shows and auctions.

• MONDAYS

- **ILFORD AND DISTRICT AQUARIST AND PONDKEEPER SOCIETY** meet on the second Monday of the month in the Churchill Room, Wanstead Library. For more information, call Ian Smith on 0208 5507329
- **THORPE AND DISTRICT AQUARIST SOCIETY** meet on the third Monday of each month at 7.45pm at the Norfolk Dumpling, Norwich. For more information, call J. Beddingfield on 01953 605394
- **ROBIN HOOD AQUARISTS** meet on the second Monday of the month, at 8pm, at the Highbank Community Centre, Farnborough Road, Clifton, Nottingham. For further details call Matt Talbot on 0115 989 3708.
- **KIRKCALDY AQUARIST SOCIETY** meet at 19-21 Junction Road, Kirkcaldy, Fife, every Monday at 8pm. Events include table shows, guest speakers and slide and video shows. Canteen, shop and toilet facilities are available. Further information from Joe Graham, 01592 782964, or John Reid 01738 634689

• TUESDAYS

- **DUNSTABLE AND DISTRICT AQUARIST SOCIETY** meet on the second Tuesday of the month at 8pm at Farley Hill Methodist Church Hall, North Drift Way, Farley Hill, Luton. For more information, call Kaven Goodrum on 01582 707280
- **TELFORD AND DISTRICT AQUARIST SOCIETY** meet every Tuesday at Hollinswood, Telford, Shropshire. For more information, contact John Harry (Membership Secretary) on 01902 372945, or Richard Armstrong (President) on 01952 616410
- **SOUTHELD LEIGH AND DISTRICT AQUARIST SOCIETY** (founded in 1935) meet on the first and third Tuesday (2nd April; 16th April and Saturday 04th May for their OPEN SHOW), at St. Andrew's Church Hall, Southview Drive, Westcliff-on-Sea, Essex. Meetings begin at 8.30pm, please call Rob Reader on 01702 305740 for more information, or e-mail robreader@hotmail.com
- **GREENOCK AND DISTRICT AQUARIST SOCIETY** meet every second and fourth Tuesday of every month, except July at Crawfordburn Community Centre, Bawhrlay Road, Greenock.
- **PRESTON AND DISTRICT AQUARIST SOCIETY** meet on the first Tuesday of each month at 7.30pm, in the Trade Hall, Station Road, Bamberidge, Preston, Lancashire. For more information, call Steve Spencer on 01772 321345
- **GREATER MANCHESTER CICHLID SOCIETY** meets on the last Tuesday of each month at Littleborough Conservative Club, Peel Street, Littleborough. Call Carl Freeman on 01422 842155 for more information.
- **YORK AND DISTRICT AQUARIST SOCIETY** meet every second Tuesday of the month at the Clarence Garden Hotel, Hexby Road, York at 8pm – old and young members are always welcome. For more information, contact club secretary Neilson Corbett on 07767 698331 or e-mail: whitwell_btinternet.com
- **THE MMAS (MIDLANDS MARINE AQUARIST SOCIETY)** has been established for about two years now. They have just changed venues and currently meet at the CITY TAVERN PUBLIC HOUSE, BISHOPGATE STREET, OFF BROAD STREET, BIRMINGHAM CITY CENTRE. Meetings are held on the THIRD TUESDAY of every month at 8.00pm upstairs in the function suite. MMAS are a specialist aquatic society in that they only focus on the marine (fish/invert/reef) side of the hobby. The club offers meetings/discussions, debates on all topics, quiz's, discounts at retail outlets, newsletter and their website is about to come online. For more details contact Warren McKenzie 0121 359 4469 or Ian Moore on 0121 449 3246.

• WEDNESDAYS

- **CLACTON FISH KEEPING CLUB** meet on the first and third Wednesday of the month. Meetings are held at 7.30pm in Clacton Community Centre, Valley Road, Clacton. For more information, call Mick Miller on 01295 428065
- **CORBAY AND DISTRICT AQUARIST SOCIETY** meets on the first Wednesday of every month at the Stephenson Way Community Centre, Stephenson Way, Corby at 8pm. Call 01538 790932 for more information.
- **TONGHAM AQUARISTS** meet every third Wednesday of every month at 8.30pm at the Mytchett Community Centre. For more information, call Andy Pearce on 01252 25686

- **HOUNSLOW CLUB** meetings, for more information call 01784 259230

- **RYDALE AQUARIST SOCIETY** meets on the first Wednesday of each month at the Bay Horse Hotel, Market Place, Pickering, North Yorkshire. Call David Marshall on 01751 472715
- **MERSEYSIDE AQUARIST SOCIETY** meets every other Wednesday at the Cattle Market Pub on Prescott Road, Liverpool. Call Ron on 0151 428 4407, e-mail: ron.brown@free.internet.co.uk or Keith on 0151 301 6085, or a-mail: keith.liz@btinternet.net
- **PORTSMOUTH AQUARIST SOCIETY** meets on the first and third Wednesday of every month at Portsmouth Community Centre, Malins Road, Buckland. Meetings begin at 8pm and go on till 10pm. There is ample car parking, and the building has disabled access. For more details contact the Club Secretary, Gill Utting on 02392 525734

• THURSDAYS

- **BRISTOL TROPICAL FISH CLUB** meet at the BABA Pavilion, Southmead Road at 8pm. Call John Stevens on 0117 9732145
- **KINGS LYNN AQUARISTS SOCIETY** meets every second Thursday of the month at Workers Club, Church Street, Kings Lynn, Norfolk. For more information, call Mike Laws 01553 763743 or Bob Usher 01553 769522

• FRIDAYS

- **YORKSHIRE CICHLID GROUP** meets at 8pm every second Friday of the month at St. Anne's Church Hall, Wentthorpe. Call Phil Oldridge on 01924 367086
- **NORTHWEST CICHLID GROUP** meet on the first Friday of the month at the British Legion, Liverpool Road, Skemmersdale, Lancs. at 8pm. For more information, call Dennis Leach on 01942 707591
- **WEST CORNWALL FISH KEEPERS** meet on the second and fourth Friday of each month at Camborne Community Centre at 8pm. For more information call Alan 01738 79485
- **BASINGSTOKE AND DISTRICT AQUARIST SOCIETY** meet on many Fridays for talks and presentations.

• OTHER ASSOCIATIONS

- **CATFISH STUDY GROUP (UK)** caters for all catfish enthusiasts with events, auctions, shows, lectures and a convention. For more information, go to www.planetcatfish.com/giguk/
- **FEDERATION OF BRITISH AQUATIC SOCIETIES (FBAS)** was founded in 1938 and has over 140 societies affiliated as members. Membership of local societies helps fish keepers solve any problems and keep in regular contact with other aquarists. For more information go to www.fbas.co.uk
- **CICHLID CITY**. If you are into cichlids, then this web-based cichlid community might be right up your street. The web-site is an open community of mainly UK-based cichlid hobbyists, with a lively chat-room – known as the Cichlid Arms – open for business every Monday and Friday at 9pm. It also contains over 150 photographs of cichlids from South and Central America, and the Rift Lakes. So click onto www.cichlidcity.co.uk
- **British Cichlid Association**: SAE for details, sample publications £3.00 to BCA DeptTF, 70 Morton Street, Middleton, Manchester M24 6AY

WE WANT TO HEAR FROM YOU!

If you would like to add your club to the list, or share about something great, send in the information and some pictures (if you've got any) to: Club Scene, Tropical Fish, Freshwater Publications, Blackwater House, Long Road, South Park, Poole, Dorset, BH12 4NZ. Tel: 01202 712080, or e-mail: clubscene@freshwaterpubs.co.uk

'MY LITTLE FISHKEEPER'

The magazine that builds into nothing to write home about... but Nick Fletcher reckons we could learn a lesson from the rip-off end of partwork publishing

Those partwork publishers are missing a trick with us fishkeepers. That's right, partworks - you must know them. 'Build a non-working replica of the Red Baron's fighter plane over 52 weeks, total cost 500 quid' or, if you're a girl, 'Make a cardboard doll's house over the same time-scale - assuming puberty doesn't hit you first and you throw over Barbie for a real-life Ken with acne and evil designs on your virtue.' I can see it now.

The first issue

'My Little Fishkeeper, first issue £1.99, usual price £9.99.' To lure you into the spiral of debt and disappointment, the first magazine would come with two sheets of glass, a tube of silicone sealant and a small bag of blue-dyed gravel. Issue two, you'd get more glass, more gravel and a ceramic castle (very realistic). After six months you'd have knocked up a nifty 18x10x10 inch tank and be eagerly awaiting the arrival of the bits to make your very own airpump. Finally, issue 52 would contain guppy vouchers, redeemable at an aquatic shop of your choice (you can't staple live fish to a magazine and even if you could, the cat would get them as they dropped through the letterbox).

Take it slow

For what you'd normally spend on a systemised six-foot cabinet aquarium, you'd end up with a tiny, dog's breakfast of a tank and a near-clinical aversion to anything with fins and a gawpy mouth. So why do I reckon this is such a great idea? Quite simply, a partwork fishtank would prevent the cardinal sin among beginners to our hobby, which is to rush things.

This is an age of instant gratification; people with the attention span of an ant who, if they can't get what they want now, throw a paddy, stomp off and do something else. That's fine if the object of your desire is a burger, or a mobile phone that transmits pictures of orgies down the pub, but not if it's living creatures - in this instance, fish.

The dodgy salesman

The trend started long ago with an aquarium in a box, bearing the legend 'Just plug in and add water'. I tried that, and after cardiac resuscitation had brought me back to life and the flames had died down, I realised it should have been the other way round. A very hot place in Hell ought to be reserved for aquatic shop staff who sell novice fishkeepers the whole kit and caboodle in one go, including the livestock. They are no better than dodgy car dealers in pork-pie hats who rent bomb-site premises and flog off GT Maestros to kids who have just passed their test. Never mind repeat business - next week, these clowns will be selling Spanish sewage farms on time-share.

Do it Kylie's way

If you're setting up your first tropical aquarium, take a leaf out of Kylie's book and do it S-L-O-W. Tank... lights and filter... water... dechlorinator... plants... switch on the electrics. Then stop. All you need (and must) do is add a small pinch of flaked food to the tank each day and buy some test kits. Ammonia and nitrite will suffice. Fish swim in their own crap, or worse. It was bibulous Yank comedian WC Fields who said he never drank water, on the grounds that: "Fish F**k in it." Enter the wee saviours of fishkeeping, the nitrifying bacteria that make sweetness out of light, or something that rhymes with it. They too, need time.

Nitrate... the answer to your prayers!

Organic waste becomes ammonia (about as entrancing to fish as Beyoncé to a Beethoven fan). Obliging Nitrosomonas bacteria convert this highly toxic chemical to nitrite, which in fish terms is like forcing a veggie to eat a bacon sandwich. Then, lo and behold, Nitrobacter bacteria finish the job, by changing just one vowel and turning nitrite into nitrate. Take it from me, if you have ever been frustrated by a lack of lush green

suckermouth catfishes (*Otocinclus affinis*). These little marvels whack the algae before it can really take a hold, after which you can call in the real algae busters, Siamese Flying Foxes (*Crossocheilus siamensis*).

Reap the rewards

Find a dealer who can get you the real thing, not lookalike imposters, and you'll have a friend for life. It's a hard old world when you set up your first tropical tank, and there

IF YOU'RE SETTING UP YOUR FIRST TROPICAL AQUARIUM, TAKE A LEAF OUT OF KYLIE'S BOOK AND DO IT S-L-O-W

algae coating your aquarium glass and all your plants, nitrate is the answer to your prayers.

Use test kits to monitor this fascinating progression, and when you get zero ammonia and zero nitrite, now is the time to add fish. But not all at once... if yours is a community tank, the sensible first choice would be Otto's. Not the coach driver in 'The Simpsons', but the dwarf South American

are plenty of people who would sell you pills and potions to speed up the maturation process. Don't fall for their sales spiel. If you think you're going too slowly, you've probably got it right: if you suspect you're going too fast, you definitely are hurrying things. But take your time and, who knows? You could be rewarded with the ultimate accolade in fishkeeping, the patter of tiny fins... **FIN**

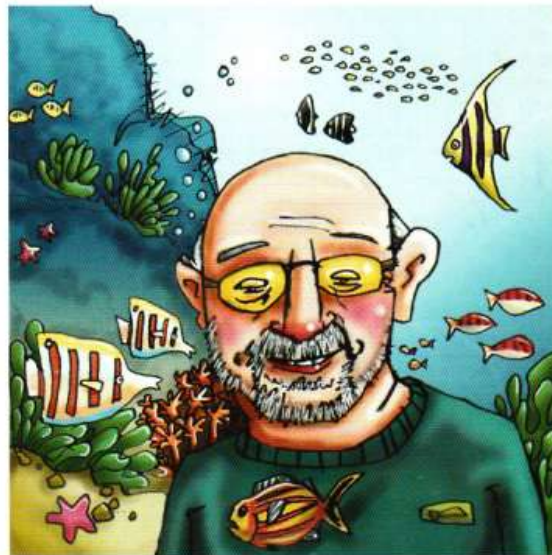


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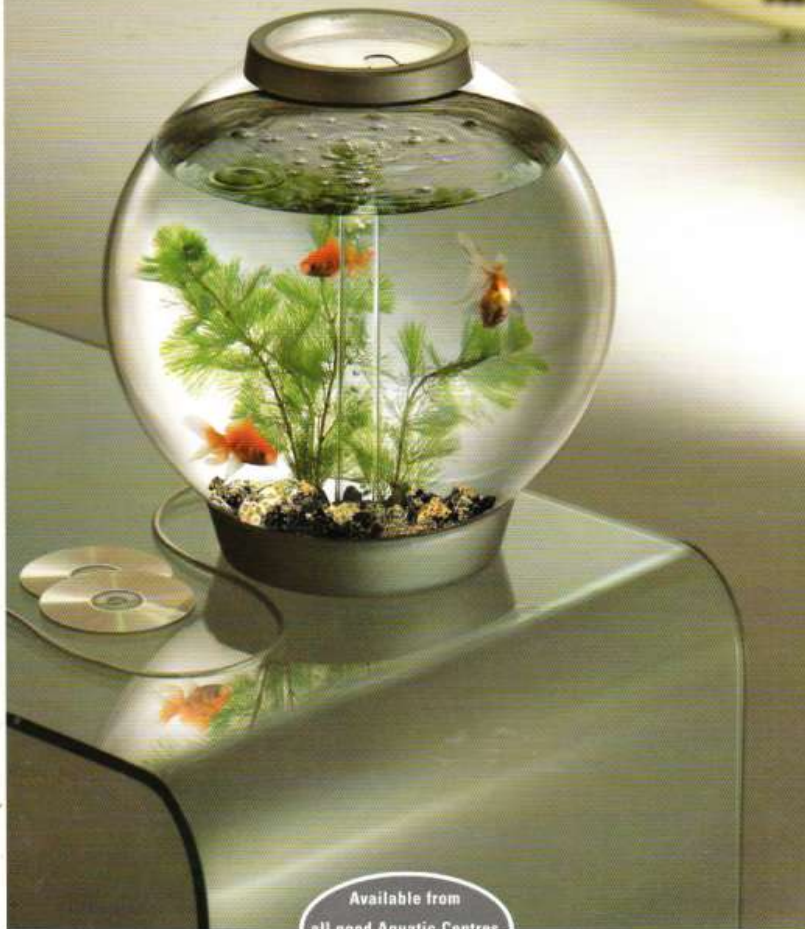
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